Environmental Assessment

For The

Mosquito Creek Timber Sale

Section 16 T22N R30W

Prepared By

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Plains Unit, Northwestern Land Office

Montana Department of Natural Resources and Conservation

May 2008

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MEMORANDUM

To: Dale Peters, Management Forester, Plains Unit

From: Larry Ballantyne, Plains Unit Resource Program Manager

Date: June 1, 2006

RE: Mosquito Creek Timber Sale Objectives

Primary Objective

The primary objective of the Mosquito Creek Timber Sale is to generate income for the Common School (CS) trust. The land parcel involved in this proposed project is located in Section 16 T22N, R30W. This project would provide an estimated 3MMBF of merchantable timber toward the Northwestern Land Office s FY 2009 timber sale program targeted volume goal.

Secondary Objectives

Minimize losses in timber volume from mortality due to insect and disease conditions present within the sale area.

Promote the continued presence and/or reestablishment of historically appropriate timber types on Trust land included in this project.

Reduce fire hazard and associated risks of loss to State of Montana, United States Forest Service, and privately owned lands in the area.

Management Directives

In planning and preparing this project, management direction of the State Forest Land Management Plan and associated Administrative Rules shall be followed. All applicable Streamside Management Zone rules and regulations will be met. Montana Best Management Practices will be applied in all instances.

CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Mosquito Creek Timber Sale
Proposed Implementation Date:	July, 2008
Proponent:	Department of Natural Resources and Conservation Northwest Land Office - Plains Unit
Location:	Section 16, Township 22 North, Range 30 West.
County:	Sanders

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC) proposes to sell approximately 24,500 tons (3.5 MMBF**)** of timber in Section 16, Township 22 North, Range 30 West, approximately 7 air miles northwest of Thompson Falls, Montana. This action would produce estimated revenue of $735,000.00 for the Common Schools (C. S.) Trust Grant. Under the proposed action, the DNRC harvest activities would maintain and improve forest health, reduce fuel loadings, and increase forest productivity beneficial to future Trust actions. The harvest prescriptions are designed to promote timber types historically found in the area, improve forest health and promote regeneration of the project area (See Attachment I, Area Maps and Project Plan; Attachment III, Harvest Prescriptions). If the Action Alternative is selected, activities may begin as soon as July, 2008.

In addition to timber harvesting, approximately 2.8 miles of new road would be constructed and approximately 1.8 miles of road would be maintained or have minor drainage improvements installed as necessary to meet Best Management Practices (BMP) (See Attachment I, Area Maps and Project Plan).

Lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions such as the public buildings trust, public schools, state colleges, universities, and other state institutions (Enabling Act of February 22, 1889:1972 Montana Constitution, Article X Section11). The Board of Land Commissioners and the Department of Natural Resources and Conservation are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). The DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996) and the Administrative Rules for Forest Management (ARM 36.11.401 through 450) as well as other applicable state and federal laws.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:
Provide a brief chronology of the scoping and ongoing involvement for this project.

Public involvement has been solicited through newspaper advertisements and through letters sent to adjacent landowners, as well as other known interested parties and organizations. Public response was solicited and used to assist in identifying issues surrounding the proposed project. Hydrological, soils, wildlife, archaeological, and vegetative concerns were identified by DNRC specialists and field foresters for both the No-Action and the Action Alternatives. Issues and concerns have been resolved or mitigated through project design and/or would be included as

specific contractual requirements of the project. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (see Attachment I, Area Maps and Project Plan; Attachment II, Resource Analyses; Attachment III, Harvest Prescriptions; Attachment IV, Mitigations; Attachment V, Consultants and References).

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

The DNRC has a cost share agreement with the United States Forest Service (USFS) for the Upper Mosquito Creek Road # 300. No other permits are anticipated.

3. ALTERNATIVES CONSIDERED:

No Action: Under the No Action alternative, no activity would be undertaken. No harvest activity, road construction or improvements would occur.

Action: The Action Alternative is shown in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale are analyzed in the EA Checklist.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:
Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

A DNRC soils scientist has reviewed the project area, transportation system and harvest plan. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analyses, Soils Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations). As detailed in the Soils Analysis, no substantial direct, indirect or cumulative impacts to soils resources are expected to result from the implementation of the Action Alternative.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identi0fy cumulative effects to water resources.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (See Attachment II, Resource Analyses, Hydrology/Fisheries Analysis & Soils Analysis; Attachment IV Mitigations). As detailed in the Hydrology/Fisheries Analysis, no substantial direct, indirect or cumulative impacts to water quality or downstream beneficial uses are expected to result from the implementation of the Action Alternative.

6. AIR QUALITY:

What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

The project is located in Montana State Airshed 2 – Flathead, and is within a Class II Airshed, just outside of Impact Zone "T" – Thompson Falls.
Some particulate matter would be introduced into the Airshed from the burning of logging slash. Impacts are expected to be minor and temporary with slash burning to be conducted when conditions favor good to excellent smoke dispersion. All burning would be conducted during times of adequate ventilation within the existing rules and regulations. Thus direct, indirect, and cumulative effects to air quality are expected to be minimal.

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

Tree removal would cause changes in the vegetative structure of the project area. Silvicultural prescriptions have been developed to keep stands moving towards historical conditions, while maintaining good tree growth and vigor. Harvest prescriptions also aim to remove diseased and insect infested timber. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment I, Area Maps and Project Plan: Attachment II, Resource Analysis, Vegetation Analysis, Attachment III, Harvest Prescriptions; Attachment IV, Mitigations). Approximately 14 acres would be removed from timber production to create road access into the sale area. No old growth stands as defined by Green et al. (1992) are present in the project area; therefore the action alternative would not affect old growth. No sensitive plants listed by the Montana Natural Heritage Program have been identified in the project area. Measures to minimize noxious weeds, insects and disease are included in the project design (See Attachment IV, Mitigations). Change to cover type distribution across the Plains unit and age class distribution would move only slightly towards a historic condition.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analyses, Wildlife Analysis & Hydrology/Fisheries Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations).
As detailed in the Wildlife Analysis and the Hydrology/Fisheries Analysis, no substantial direct, indirect or cumulative impacts to terrestrial, avian and aquatic species and habitats are expected to result from the implementation of the Action Alternative.

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analyses, Wildlife Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations). As detailed in the Wildlife Analysis, no substantial direct, indirect or cumulative impacts to unique, endangered, fragile or limited environmental resources are expected to result from the implementation of the Action Alternative.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:
Identify and determine effects to historical, archaeological or paleontological resources.

A DNRC Archaeologist has reviewed the project area and harvest plan. No cultural resource concerns with the Mosquito Creek Area were identified, mainly because they are on relatively steep (steep from an archaeological perspective) slopes. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analysis, Archaeological Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations).

Therefore no substantial direct, indirect or cumulative impacts to historical, archaeological or paleontological resources are expected to result from the implementation of the Action Alternative.

11. AESTHETICS:
Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

Portions of the project would be visible from State Hwy 200. Openings or disturbance from skyline corridors and skid trails would be visible upon completion of the project. The harvest prescriptions and the use of skyline yarding systems should minimize the visual impacts. Thus direct, indirect, and cumulative impacts to aesthetics are expected to be minimal.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:
Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects to environmental resources.

No direct, indirect, or cumulative impacts would likely occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:
List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

No other projects have been identified.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:
Identify any health and safety risks posed by the project.

Human health would not be impacted by the proposed timber sale or associated activity. There are no unusual safety considerations associated with the proposed timber sale.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:
Identify how the project would add to or alter these activities.

Timber harvest would provide continuing industrial production in Sanders County.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:
Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale, there would be no measurable direct, indirect, or cumulative impacts from this proposed action.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:
Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

People are currently paying taxes from the wood products industry in the region. Due to the relatively small size of the timber sale, there would be no measurable direct, indirect, or cumulative impacts from this proposed action on tax revenues.

18. DEMAND FOR GOVERNMENT SERVICES:
Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

Log trucks hauling to the purchasing mill would result in temporary increases in traffic on the designated haul route. This increase is a normal contributor to the activities of the local community and industrial base and cannot be considered a new or increased source. Cumulative impacts are not likely to occur.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:
List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

On June 17, 1996, the Land Board approved the State Forest Land Management Plan (SFLMP). The SFLMP provides the philosophy adopted by DNRC through programmatic review (DNRC, 1996). The DNRC will manage the lands in this project according to this philosophy, which states:

> *Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biological diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream… In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.*

On March 13, 2003, the DNRC adopted Administrative Rules for Forest Management (Rules) (Administrative Rules of Montana [ARM] 36.11.401 through 450). The Rules provide DNRC personnel with consistent policy, direction, and guidance for the management of forested trust lands. Together, the SFLMP and Rules define the programmatic framework for this project.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:
Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

This area is an access point for hunting and recreation on public lands, governed by seasonal road closures. New roads constructed through the area that would be closed after the project only access the immediate area, therefore closure of them would not affect the ability of people to recreate on these parcels.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:
Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing.

There would be no measurable direct, indirect, or cumulative impacts related to population and housing due to the relatively small size of the timber sale, and the fact that people are already employed in this occupation in the region.

22. SOCIAL STRUCTURES AND MORES:
Identify potential disruption of native or traditional lifestyles or communities.

No direct, indirect, or cumulative impacts related to social structures and mores would be expected under either alternative.

23. CULTURAL UNIQUENESS AND DIVERSITY:
How would the action affect any unique quality of the area?

No direct, indirect, or cumulative impacts related to cultural uniqueness and diversity would be expected under either alternative.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:
Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building, logging systems and terms of sale. The Action Alternative would generate an estimated return to the school trusts of $735,000.00. Under the No Action Alternative, There would not be any income generated by this parcel for the school trust at this time.

EA Checklist Prepared By:	**Name:**	Dale Peters	**Date:**	April, 2008
	Title:	Management Forester		

V. FINDING

25. ALTERNATIVE SELECTED: The Action Alternative is selected for implementation

26. SIGNIFICANCE OF POTENTIAL IMPACTS: No significant impacts have been identified as a result of implementing the Action Alternative.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

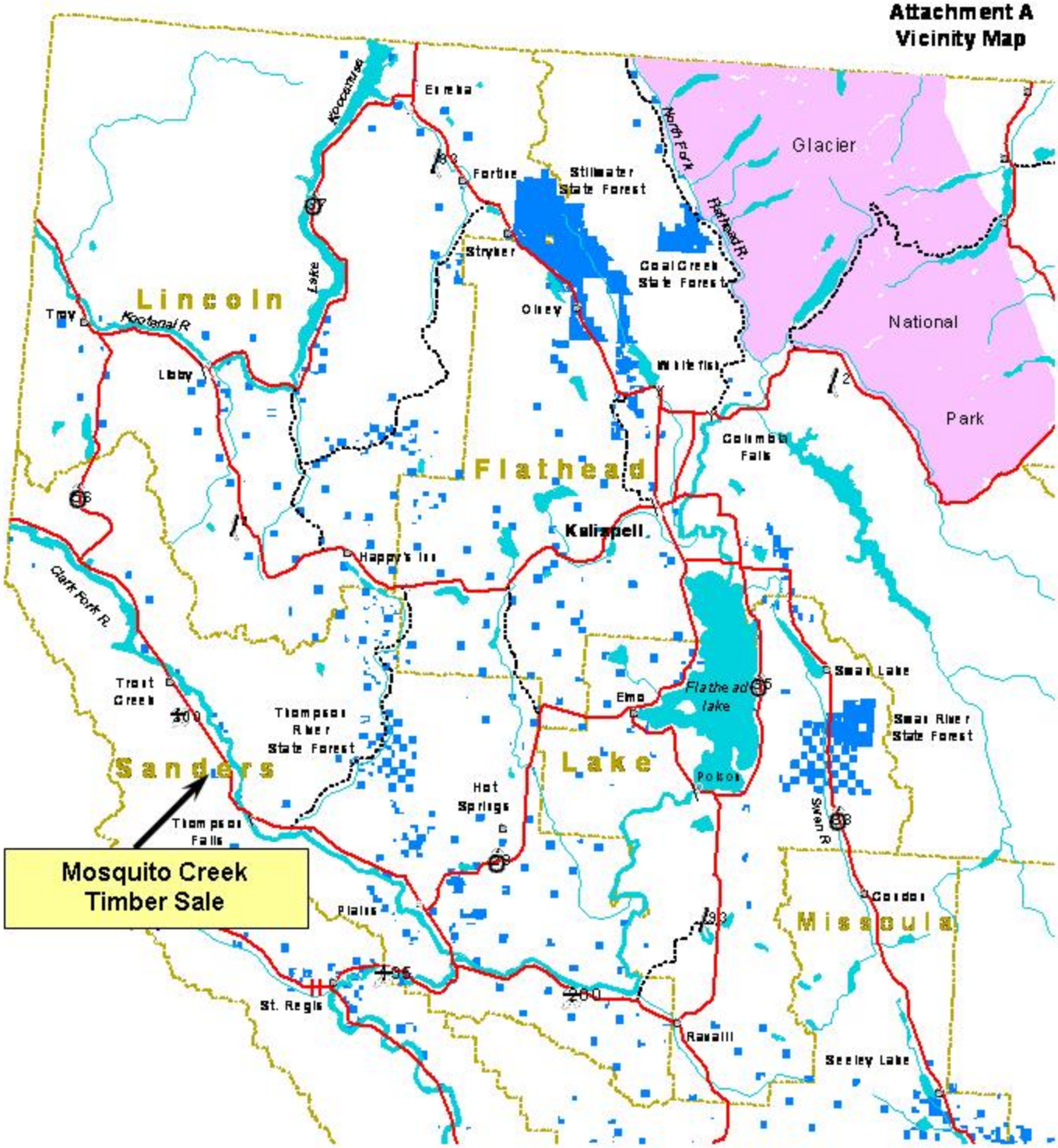
☐	EIS	☐	More Detailed EA	☒	No Further Analysis

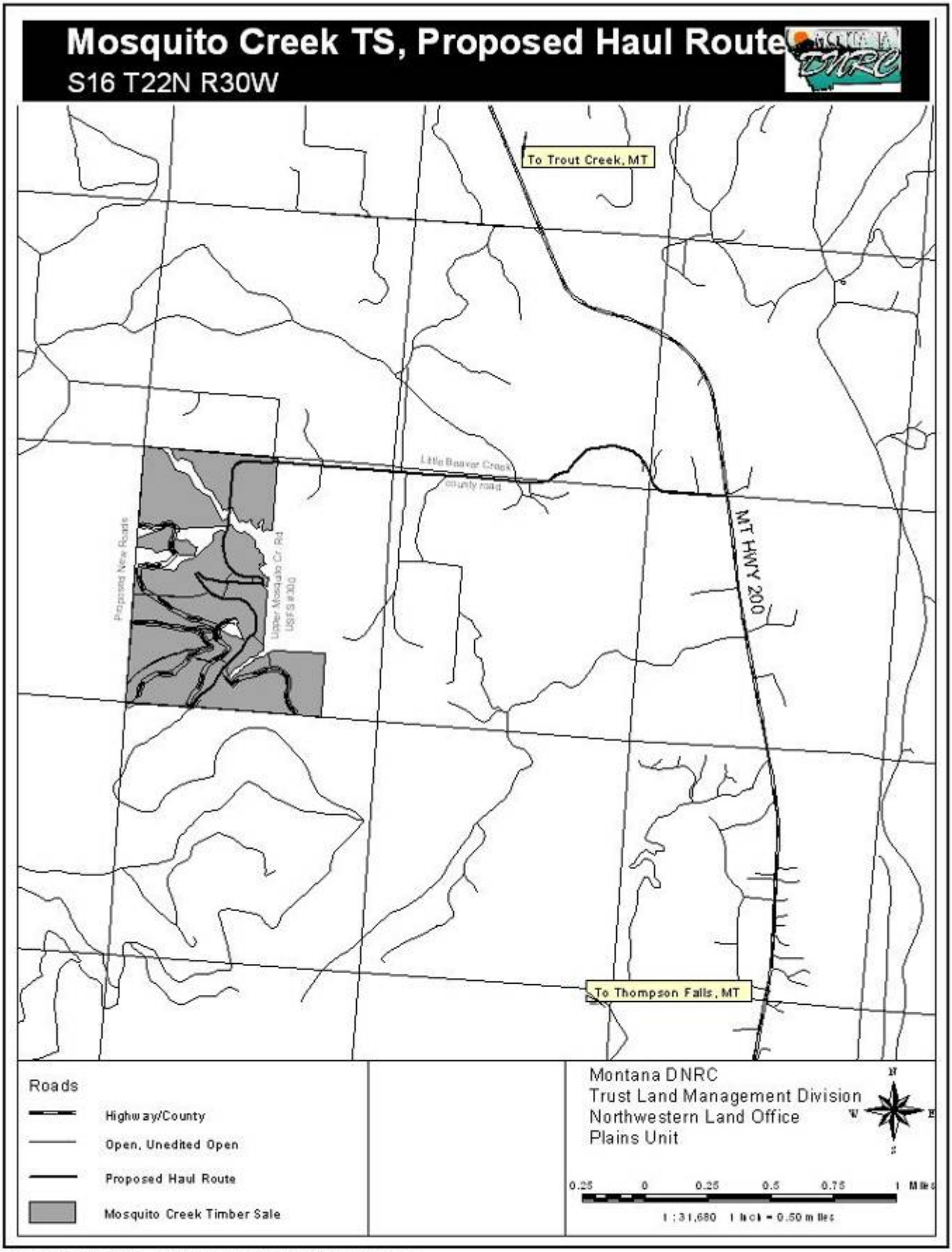
EA Checklist Approved By:	**Name:**	Larry Ballantyne
	Title:	Plains Unit Resource Program Manager
Signature:	L Ballantyne	**Date:** 5/2/08

Attachment I
Area Maps and Project Plan

Vicinity Map	**17**
Transportation Plan Map	**18**
Harvest Plan Map	**19**
Current Vegetation Cover Type Map	**20**
Desired Future Condition Map	**21**

Attachment A
Vicinity Map




Mosquito Creek TS, Proposed Haul Route
S16 T22N R30W
To Trout Creek, MT
Little Beaver Creek
county road
Proposed New Roads
Upper Mosquito Cr. Rd
USFS #300
MT HWY 200
To Thompson Falls, MT
Roads
Highway/County
Open, Unedited Open
Proposed Haul Route
Mosquito Creek Timber Sale
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit
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W
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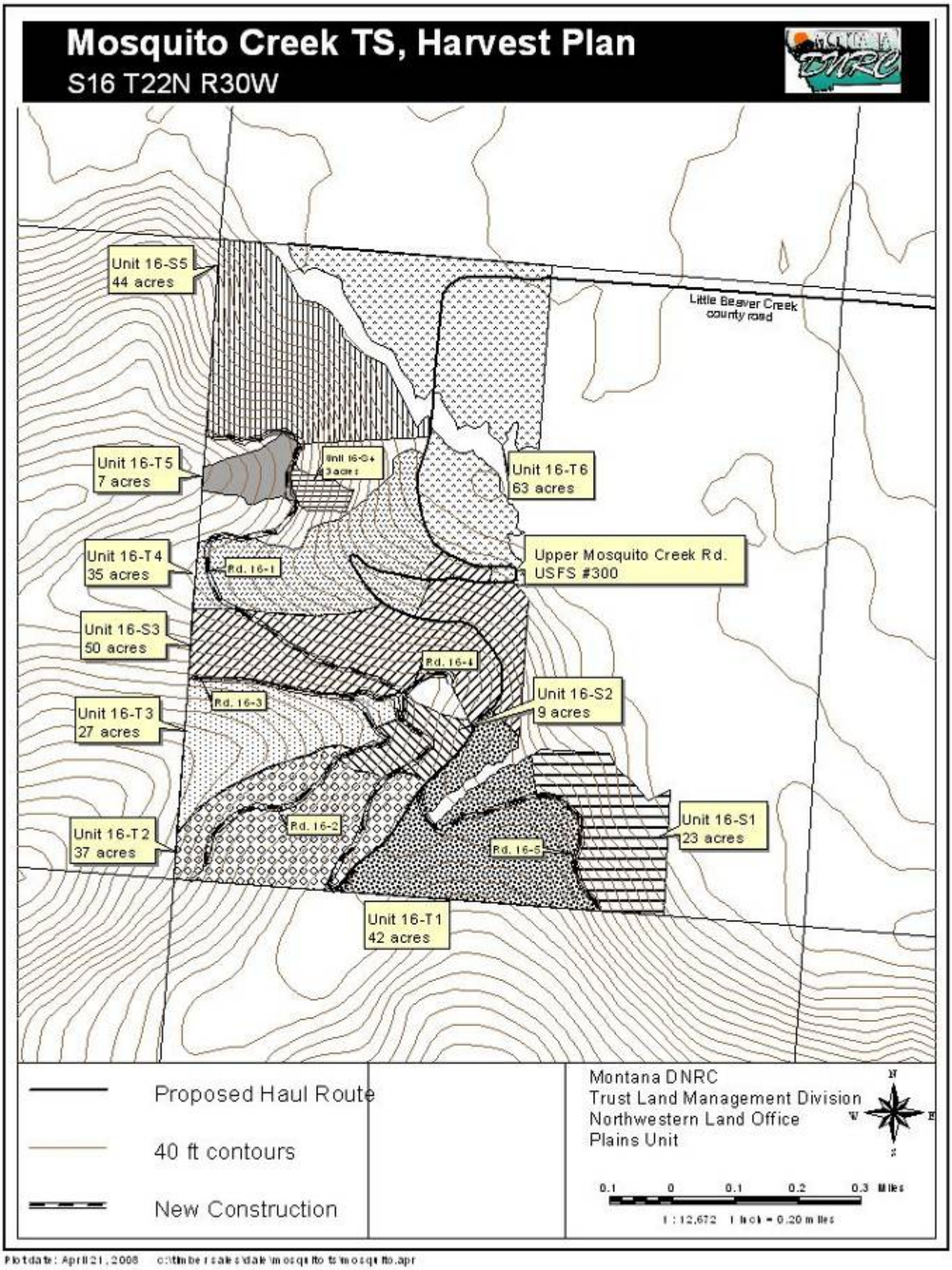
S
0.25 0 0.25 0.5 0.75 1 Miles
1 : 31,680 1 Inch = 0.50 miles
Plotdate: April 21, 2008 c:\timber sales\dale\mosquito ts\mosquito.apr


Mosquito Creek TS, Harvest Plan
S16 T22N R30W
Unit 16-S5
44 acres
Little Beaver Creek
county road
Unit 16-T5
7 acres
Unit 16-T6
63 acres
Unit 16-T4
35 acres
Rd. 16-1
Upper Mosquito Creek Rd.
USFS #300
Unit 16-S3
50 acres
Rd. 16-4
Unit 16-S2
9 acres
Rd. 16-3
Unit 16-T3
27 acres
Unit 16-S1
23 acres
Rd. 16-2
Unit 16-T2
37 acres
Rd. 16-5
Unit 16-T1
42 acres
Proposed Haul Route
40 ft contours
New Construction
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit
N
W
E
S
0.1 0 0.1 0.2 0.3 Miles
1 : 12,672 1 Inch = 0.20 miles
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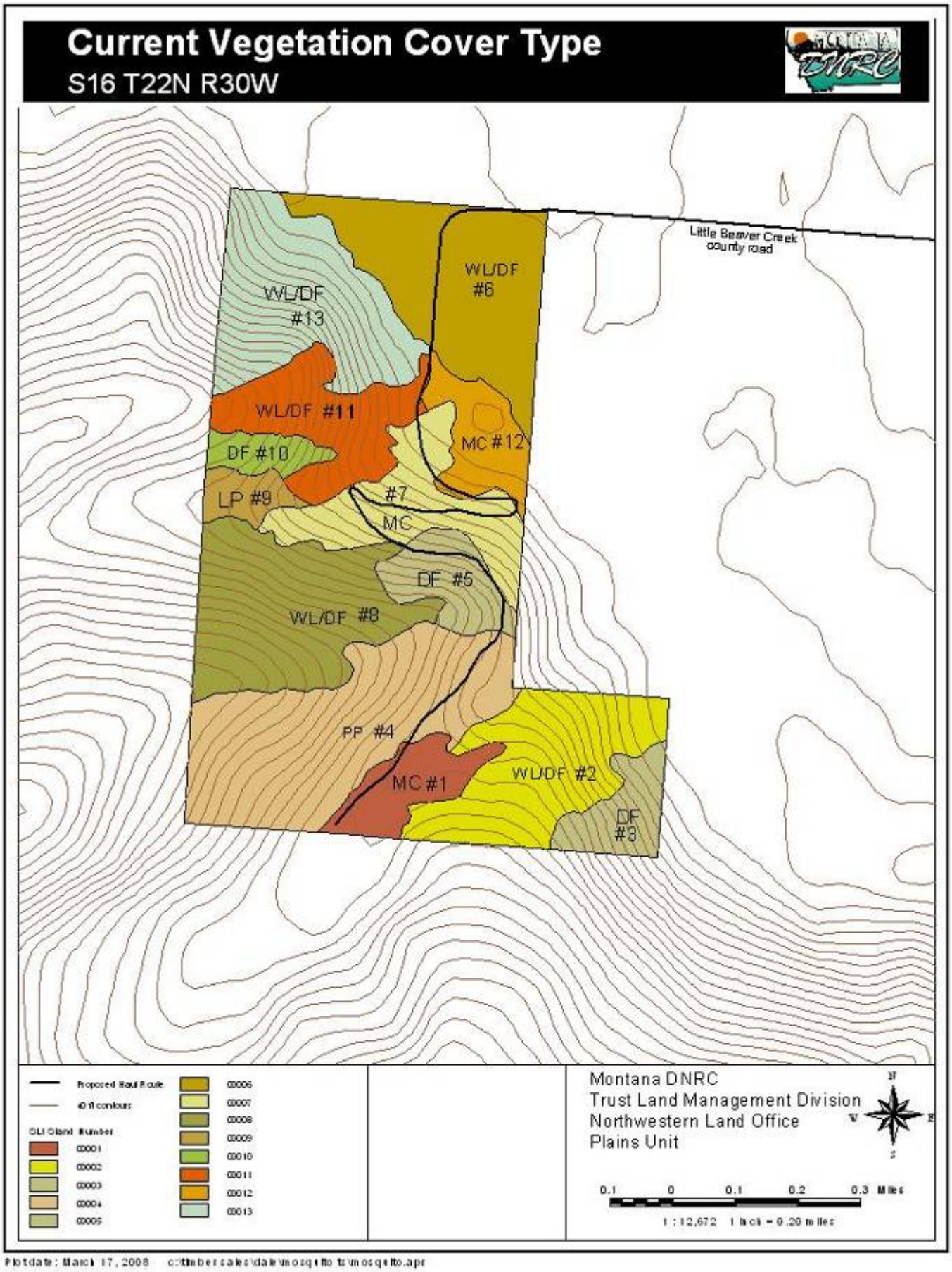
Current Vegetation Cover Type
S16 T22N R30W
Little Beaver Creek
county road
WL/DF
#13
WL/DF
#6
WL/DF #11
MC #12
DF #10
LP #9
#7
MC
DF #5
WL/DF #8
PP #4
MC #1
WL/DF #2
DF
#3
Proposed Haul Route
40 ft contours
GLI Gland Number
00001
00002
00003
00004
00005
00006
00007
00008
00009
00010
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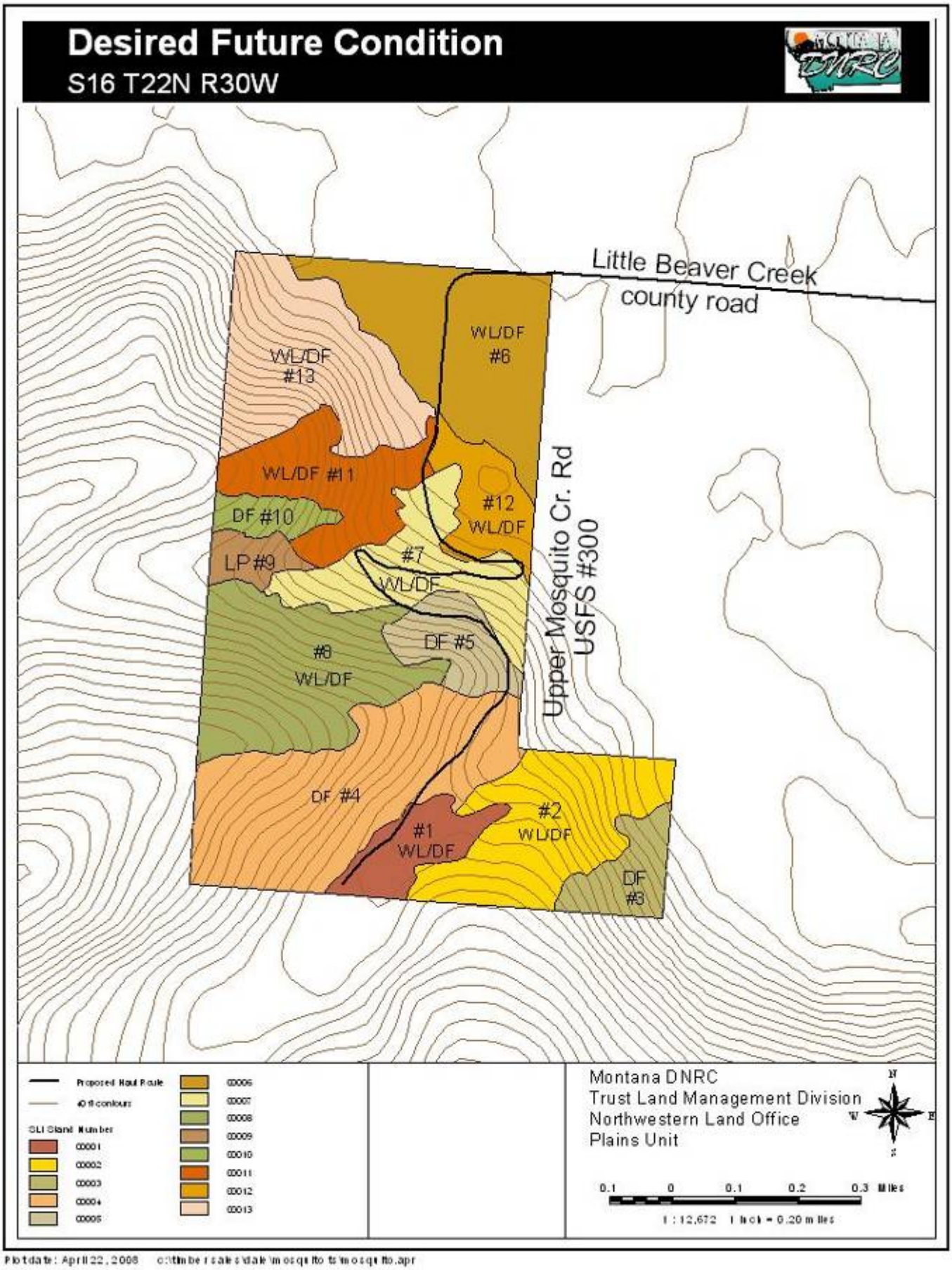
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit
0.1 0 0.1 0.2 0.3 Miles
1 : 12,672 1 inch = 0.20 miles
Plotdate: March 17, 2008 c:\timbersales\dale\mosquito ts\mosquito.apr


Desired Future Condition
S16 T22N R30W
Little Beaver Creek
county road
Upper Mosquito Cr. Rd
USFS #300
WL/DF
#13
WL/DF
#6
WL/DF #11
#12
WL/DF
DF #10
LP #9
#7
WL/DF
DF #5
#8
WL/DF
DF #4
#1
WL/DF
#2
WL/DF
DF
#3
Proposed Haul Route
40 ft contours
SLI Stand Number
00001
00002
00003
00004
00005
00006
00007
00008
00009
00010
00011
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Montana DNRC
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1 : 12,672 1 Inch = 0.20 miles
Plot date: April 22, 2008 c:\timber sale\dale\mosquito ts\mosquito.apr

Attachment II
Resource Analysis

Vegetation Analysis **25**

Hydrology / Fisheries Analysis **27**

Soils Analysis **30**

Wildlife Analysis **35**

Archaeological Analysis **55**

Footnote: All proposed road miles, harvest boundaries and acreages are close approximations as this proposal has not yet been implemented on the ground.

VEGETATION ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the vegetative resource and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were developed by the public and internally regarding vegetative conditions. The following concerns were expressed from these comments regarding proposed timber harvesting and related activities:

- Concern for maximizing the return to the School Trust Fund by intensively managing for healthy and biologically diverse forests.
- Improve forest health. Minimize losses in timber volume from mortality due to insect and disease conditions present within the sale area.
- Promote the continued presence and/or restoration of historically appropriate timber types on Trust Land included in this project.
- Reduce fire hazard and associated risks of loss to State of Montana, United States Forest Service, and privately owned lands in the area.
- Concern regarding the impacts to threatened and endangered plant and animal species.

Analysis Area

The analysis area for direct and indirect effects to the State Section 16 of T22N R30W, referred to as the Mosquito Creek parcel. Cumulative impacts are considered at the scale of the Plains Unit.

Analysis Method

The Plains Unit typically prepares two to four timber sales per year. Each proposed project is evaluated for its potential effects on lands managed by the DNRC and the surrounding landscape. Methods used in the analysis included review of stand level inventory (SLI) data, field visits, review of scientific literature, aerial photography, and consultation with other professionals.

Existing Condition

Logging activities have occurred on this proposed project area since the 1930's. Section records for the Mosquito Creek parcel show commercial timber harvest activity in 1978 removing 290 mbf. There have also been numerous firewood, post and pole permits for this parcel. Current Vegetation Cover Types and Desired Future Condition stand maps can be viewed in Attachment I, Area Maps and Project Plan. Past management activities have contributed to a movement away from the Desired Future Condition in many stands within this parcel. The mountain pine beetle *(Dendroctonus ponderosae)* has contributed to the mortality of the majority of the lodgepole pine *(Pinus contorta)* within this parcel creating a heavy fuel load. Insects and diseases that have been identified to a lesser extent within this parcel are, Armillaria Root Disease *(Armillaria ostoyae)* and Douglas-fir Beetle *(Dendroctonus pseudotsuga)* in the Douglas-fir *(Pseudotsuga menziesii),* dwarf mistletoe *(Arceuthobium laricis)* in the western larch *(Larix occidentalis)*, and Fir Engraver *(Scolytus ventralis)* in the grand fir *(Abies grandis).* See Attachment IV, Harvest Prescriptions, for more detailed descriptions of current vegetative conditions.

There is a component of noxious weeds within this parcel, most notably in the lowest elevation that has been heavily grazed by livestock. These include St. Johnswort *(Hypericum perforatum)*, sulfur cinquefoil *(Potentilla recta)*, Oxeye Daisy *(Chrysanthemum leucanthemum)* and Common mullein *(Verbascum thapsus)*. The following noxious weeds have also been noted in and adjacent to the existing open road; St. Johnswort, Spotted Knapweed *(Centaurea maculosa)* and

Blueweed (*Echium vulgare*). Western brackenfern (*Pteridium aquilinum)*, a native perennial fern that is classified as an increaser in response to grazing by cattle, comprises approximately 25% of the available forage.

Direct and Indirect Effects

No Action Alternative

No timber harvest or associated activities would occur under this alternative. Timber types in the Mosquito Creek parcel would continue to advance towards climax conditions. Growth and vigor of the trees present in the analysis area would continue to decline. The mountain pine beetle would continue to cause increased mortality creating a heaver fuel load and an increased fire danger.

Action Alternative

The proposed action alternative for the Mosquito Creek parcel would harvest timber on approximately 340 acres. Dominant and co-dominant trees with good crowns and vigor would be retained. Removal of the less vigorous, suppressed trees in addition to those affected by mountain pine beetle, Armillaria Root Disease, Douglas-fir Beetle, dwarf mistletoe and Fir Engraver would result in a thinned, healthier stand of timber. Tree growth and vigor should increase, as residual tree spacing would allow more sunlight to individual tree crowns, increased access to water and nutrients in the soil. More detailed information for treatment by individual units can be obtained in Attachment IV, Harvest Prescriptions. Gated road closures would prevent the unauthorized removal of snags. Through harvest and site preparation activities, fuel loadings and fire danger would be reduced by the removal of ladder fuels from the understory, as well as crown spacing in the intermediate and overstory components. Noxious weeds would be monitored and addressed through an integrated pest management plan including, but not limited to chemical and biological control methods.

Cumulative Effects

No Action Alternative

Under this alternative, stand structure and species composition on State land across the Plains Unit are expected to continue the change towards more shade tolerant species. Fuel loading is also expected to increase.

Action Alternative

Across the Plains Unit, there would be a slight increase toward Desired Future Conditions as proposed treatments would alter the Current Vegetation Cover Types. The project area would be altered with regard to overall size class distribution and stocking levels. Fuel loading, ladder fuels, insect and disease incidence would be reduced. This change would have a minor impact across the landscape of the Plains Unit as this project affects approximately only 340 acres of the 52,795 acres on the Plains Unit.

HYDROLOGY ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the hydrologic resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding water quality or quantity or fisheries resources. The following issue statements were expressed from internal comments regarding the effects of proposed timber harvesting:

- Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.

These issues can best be evaluated by analyzing the anticipated effects of harvest prescriptions and sediment delivery on the water quality of streams in the project area.

The Environmental Effects sections disclose the anticipated indirect, direct and cumulative effects to water resources within the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

The primary concerns relating to aquatic resources within the analysis area are potential impacts to water quality from sources outside the channel as well as inside the channel. In order to address these issues the following parameters are analyzed by alternative:

-Miles of new road construction and road improvements
-Potential for sediment delivery to streams

Issues/Comments Dismissed from Further Review

-While annual water yield increases for project area streams are typically modeled and disclosed for timber harvest proposals, this analysis does not discuss water yield because of the lack of connected stream network. I have completed a coarse filter screening according to the DNRC Forest Management Rules, 36.11.423(1)(b), but due to the very low potential for impacts, no further analysis was deemed appropriate.

-During field review, no fish-bearing streams were identified within the state parcel. Therefore, no further analysis of fisheries will be conducted.

SEDIMENT DELIVERY

Analysis Method

The methods applied to the project area to evaluate potential direct, indirect and cumulative effects include a field review to look at potential sediment sources from haul routes. Roads were evaluated to determine existing sources of sediment delivery to streams. In addition, soil types in the project area were reviewed to identify areas prone to erosion and sediment delivery.

Analysis Area

The analysis area for sediment delivery is limited to the harvest units and roads used for timber sale access and hauling.

WATER USES AND REGULATORY FRAMEWORK

Water Quality Standards

This portion of the Clark Fork River basin is classified as B-1 by the State of Montana Department of Environmental Quality (DEQ), as stated in the Administrative Rules of Montana (ARM 17.30.607). The water quality standards for protecting beneficial uses in B-1 classified watersheds are located in ARM 17.30.623. Water in B-1 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. State water quality regulations prohibit any increase in sediment above naturally occurring concentration in water classified B-1. Naturally occurring means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Reasonable land, soil and water conservation practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. The State of Montana has adopted Best Management Practices (BMPs) through its non-point source management plan as the principle means of meeting the Water Quality Standards.

Streamside Management Zone Law (SMZ)

All rules and regulations pertaining to the Streamside Management Zone (SMZ) Law would be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater then 35%. An SMZ width of 50 feet is required when the slope is less than 35%.

EXISTING CONDITION

Sediment Delivery

The project area is split between two 6th code hydrologic units: Beaver Creek and Mosquito Creek watersheds. Neither stream flows on or near the state parcel. Furthermore, no surface water exists on the parcel that connects to a downstream waterbody.

On the parcel, a very small Class II stream flows in a southeast-to-northwest direction for approximately 1,400 feet before existing the parcel. During field reconnaissance, this channel was carefully reviewed for downstream connectivity. At the county road crossing approximately 2,000 feet downstream from the parcel boundary, no evidence of streamflow was found.

Within the State-owned parcel, only one road currently exists. Although the road was designed with a culvert near the aforementioned Class II stream, the perennial flow of the stream begins approximately 500 away from the crossing. Therefore, no sediment delivery to streams on DNRC lands was identified from roads or upland sources.

Livestock grazing on the state parcel has occurred since at least 1972. The livestock most likely spend much time in the northern portion of the parcel where the terrain is nearly level and the Class II stream exists. Evidence of bank trampling is apparent along the entire length of this stream.

ENVIRONMENTAL EFFECTS

No Action Alternative

No timber harvest or associated activities would occur under this alternative.

Action Alternative

Eleven units totaling approximately 342 acres would be commercially harvested under the Action Alternative. Approximately 211 acres would be harvested using conventional ground-based equipment while the remaining 131 acres would be treated using cable methods. In addition, approximately 2.8 miles of new road would be constructed and approximately 1.8 miles of road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Harvest may be completed under summer or winter conditions. Grazing would be suspended until adequate regeneration is established.

Direct and Indirect Effects of Sediment Delivery

No Action Alternative

Under this alternative, no timber harvest or related activities would occur. No direct or indirect impacts to water quality from sediment delivery would be expected.

Action Alternative

Harvesting under this alternative would occur outside of the Class II SMZ and no new stream crossings would be constructed. Because BMPs would be implemented to reduce the potential for excessive erosion including operating during the appropriate season (dry, frozen or snow-covered) and using appropriate methods (cable vs. ground-based), the risk of sediment delivery to streams would be low. In addition, the terrain adjacent to the Class II stream is flat, reducing the potential for sediment delivery into the stream channel.

Cumulative Watershed Effects of Sediment Delivery

No Action Alternative

No additional cumulative effects beyond those described in the existing condition would be expected.

Action Alternative

There would be a low risk of additional cumulative effects from the implementation of this alternative beyond those described under the No Action Alternative because of the following reasons:

1) All operations would occur using appropriate forestry BMPs. This would reduce the potential for adverse levels of soil displacement and subsequent sediment transport, and
2) No stream crossings were identified on the haul route that would increase sediment delivery.
3) Cattle grazing would be removed for several years which would likely reduce bank trampling and increase or maintain channel bank stability.

SOILS ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding soil impacts. The following issue statement was expressed from internal comments regarding the effects of proposed timber harvesting:

- Timber harvest activities may result in reduced soil productivity and increased erosion due to compaction and displacement, depending on area and degree of harvest effects.

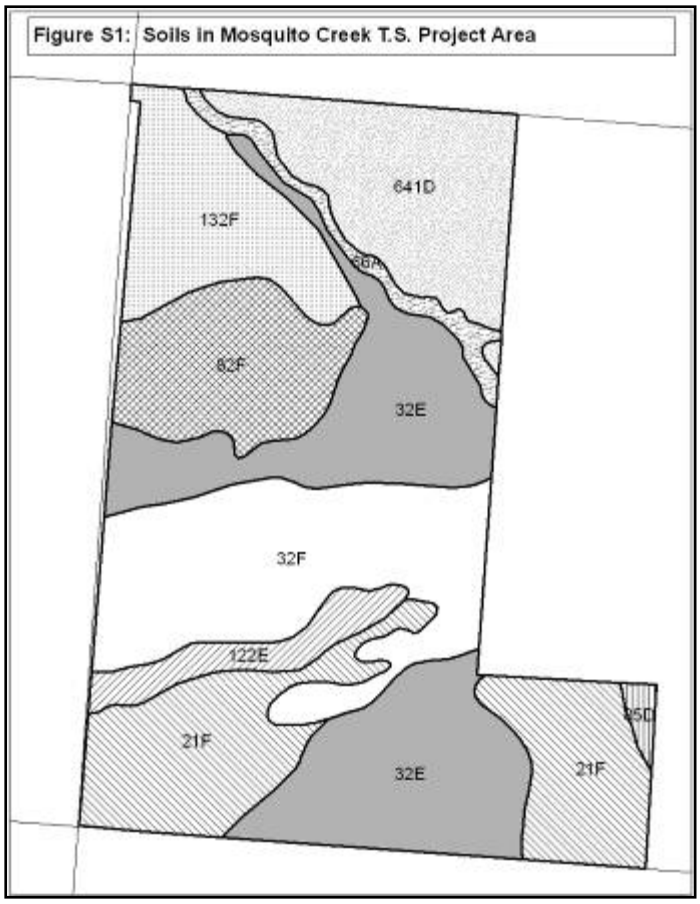
Analysis Area

The analysis area for soil impacts will be the proposed harvest units although soil descriptions for the entire state parcel will be disclosed in the Existing Condition. This analysis area will adequately allow for disclosure of existing conditions, direct, indirect and cumulative impacts.

Analysis Methods

Methods for disclosing impacts include using general soil descriptions and the management limitations of the landtype and then qualitatively assessing the risk of negative effects to soil productivity from compaction and displacement from each alternative. In addition, a general description of the past impacts will assist in locating areas sensitive to impacts from erosion, compaction and displacement. Finally, this analysis will qualitatively assess the risk of negative effects to soils from erosion, compaction and displacement from each alternative using insight from previously collected soils monitoring data from over 70 post harvest monitoring projects. While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.

Figure S1: Soils in Mosquito Creek T.S. Project Area



EXISTING CONDITIONS

General Conditions

Two separate soil surveys have been conducted in the vicinity of the project. The main source used to display and analyze potential impacts in the project area is the inventory by the Natural Resources Conservation Service entitled, *Soil Survey of Sanders and Parts of Lincoln and Flathead Counties, Montana* (NRCS, 1996). This publication describes some of the soil features that affect the management of soils in the project area. The information provided in this publication also assists in predicting soil behavior in response to management actions.

In addition, the *Lolo National Forest Land Systems Inventory* (USDA, 1988) was reviewed for management considerations and landtype information. *Landtype* refers to a unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The landtypes

may include several soils within the project area. In this particular case, two landtypes are found while eight soil types were identified in the project area. Table ST-1 provides a brief description of the soil types within the project area while Figure S-1 provides a visual depiction of the soil type locations.

The Plains Unit is dominated by partially metamorphic, sedimentary rocks from the 600-million year old Belt Supergroup. The PreCambrian rocks in this area are generally comprised of argillites, quartzites and siltites. (Collins and Ottersberg, 1985). These general rock types tend to be stable with a low erosion potential. Overlying these sediments is a layer of loess influenced volcanic ash deposited and redeposited from Mount Mazama approximately 6700 years ago. The presence of volcanic ash or lacustrine silts may increase the erosion potential depending upon slope, vegetation and surface rock

Table ST-1: Project Area Soil Resource Descriptions

Soil Description			Management Implications (erosion hazard)	
Soil Type	Name	Soil & Vegetation Descriptions	K factor**/erosion potential*	Comments
21F Landtype 22MA	Combest gravelly ashy silt loam 35-60% slopes	Somewhat excessively well-drained soils comprised of gravelly silt loams with a volcanic ash influence. Up to 35% rock fragments in the upper layers, lower layers generally have higher rock content. Generally, forested with Douglas-fir, western larch and other conifers.	K=0.20 Erosion potential is considered severe.	Operating during frozen or snow-covered conditions can mitigate erosion potential. Steeper slopes should be harvested using cable systems. Longer season of operation is available due to well-drained characteristics of most of these soils. However, soils in Landtype 14JA may have a shorter season of operation.
32E/F Landtype 22MA	Mitten gravelly ashy silt loam E- 15-35% slopes F- 35-60% slopes	Soils are somewhat excessively well-drained. Surface soils are volcanic ash influenced gravelly silt loam with up to 35% rock fragments overlying a very gravely loam soil with up to 60% rock fragments.	K=0.17 Erosion potential is moderate to severe depending upon slope.	
66A Landtype 14JA	Big Beaver silt loam 0-2% slopes	Poorly drained, floodplain derived from alluvium with a silt loam surface layer. Rock content is very low or nonexistent. Generally forest land with moist vegetation types.	K=0.32 Erosion potential is slight due to the gentle slopes.	
82F Landtype 22MA	Sharrott, cool-rock outcrop-Rubble land complex 15-60% slopes	Soils are well-drained and derived from residuum and colluvium from argillites and quartzite. Up to 45% of this soil type is rock outcrops and rubble land. Surface soils are shallow and vegetation is characteristic of a dry habitat type.	K=0.20 Erosion potential is considered severe in areas with fine material.	
85D Landtype 14JA	Whitepine ashy silt loam 4-15% slopes	Soils are well drained although the permeability is very slow. The surface soil on these terraces is generally a silt loam. Rock fragments are very limited. Vegetation is a mixed conifer cover of Douglas-fir, western larch and others.	K=0.49 Erosion potential is moderate due to the gentle slopes.	
132F Landtype 22MA	Mitten-Tevis complex 35-60% slopes	Soils are somewhat excessively well drained and derived from volcanic ash overlying colluvium. Surface soils are gravely silt loam overlying coarser subsoil.	K=0.17-0.20 Erosion potential is severe due to steeper slopes slope.	
641D Landtype 14JA	Lionwood-Scotmont-Whitepine complex 4-15% slopes	Surface soils in this well-drained soil type are range from silt loam to fine sandy loam. The dominant parent material is volcanic ash-influenced glacial lake deposits. Vegetation is mainly western larch and Douglas fir.	K-0.24 – 0.49 Erosion potential is moderate due to the gentle slopes.	

* Erosion Potential is based on slope and soil erosion factor K**. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50-70 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion – control measures including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion–control measures are costly and generally impractical. (NRCS, 1996)

**Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. (NRCS, 1996)

Cumulative Effects

DNRC strives to maintain soil productivity by limiting cumulative soil impacts to 15% or less of a harvest area as noted in the State Forest Management Plan (DNRC, 1996). As a recommended goal, if existing detrimental soil effects exceed 15% of an area, proposed harvest should minimize any additional impacts. Harvest proposals on areas with existing soil impacts in excess of 20% should avoid any additional impacts and include restoration treatments as feasible base on site-specific evaluation and plans. Past monitoring on DNRC timber sales from 1988 to 2003 has shown an average of 13.9% soil impacts across all parent materials. Stratifying the results by soil (gravelly silt loams) similar to the Mosquito Creek parcel, shows an average of approximately 13% of the harvest areas impacted (DNRC, 2004). It must be noted that most of these similar sites (7 of 9) were harvested during the winter season, which typically has less impacts than summer harvest operations.

Cumulative effects from past and current uses on this parcel are limited to roads and livestock grazing. Past harvest operations in the Mosquito Creek parcel includes a small harvest in 1929, 290mbf in 1978 for road construction and a small pole sale in 1986. In addition, it is assumed that firewood gathering has occurred throughout the last 75 years. Livestock grazing has occurred throughout the parcel since at least 1972. Evidence of grazing in the northeast corner of the parcel includes soil compaction from hoof pressure and very limited natural regeneration. The lack of, or limited natural regeneration may be attributed to livestock grazing.

Because, past timber harvest entries are very limited in this parcel, cumulative impacts to soils from compaction and displacement are estimated to cover less than 1% of the parcel. Compaction and displacement from livestock grazing is limited to the level terrain in the NE portion of the parcel. Compaction is present on an estimated 75% of the area (approximately 52 acres). However, the depth of compaction from grazing is relatively shallow (5-10cm) does not necessarily result in reduced tree growth (Sharrow, 2007).

ENVIRONMENTAL EFFECTS

No Action Alternative

No timber harvest or associated activities would occur under this alternative.

Action Alternative

Eleven units totaling approximately 342 acres would be commercially harvested under the Action Alternative. Approximately 211 acres would be harvested using conventional ground-based equipment while the remaining 131 acres would be treated using cable methods. In addition, approximately 2.8 miles of new road would be constructed and approximately 1.9 miles of road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Harvest may be completed under summer or winter conditions. Grazing would be suspended until adequate regeneration is established.

Direct and Indirect Effects

No Action Alternative

No timber harvest or associated activities would occur under this alternative. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases.

Action Alternative

To provide an adequate analysis of potential impacts to soils, a brief description of implementation requirements is necessary. The Administrative Rules of Montana 36.11.422 (2) and (2) (a) state that appropriate BMPs shall be determined during project design and incorporated into implementation. To ensure the incorporated BMPs are implemented, the specific requirements would be incorporated into the DNRC Timber Sale Contract. As part of this alternative design, the following BMPs are considered appropriate and, therefore would be implemented during harvest operations:

1) Limit equipment operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

2) On ground skidding units, the contractor and sale administrator would agree to a general skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use, and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) would not be used and may be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

3) Tractor skidding should be limited to slopes less than 40% unless the operation can be completed without causing excessive erosion. Short steep slopes above incised draws may require a combination of mitigation measures based on site review, such as adverse skidding to ridge or winch line skidding from more moderate slopes less than 40%.

4) Keep skid trails to 20% or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrent with operations.

5) Slash Disposal- Limit disturbance and scarification combined to 30-40% of harvest units. No dozer piling on slopes over 35%; no excavator piling on slopes over 40% unless the operation can be completed without causing excessive erosion. Consider lop and scatter or jackpot burning on steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.

6) Retain 10 to 15 tons large woody debris and a majority of all fine litter feasible following harvest. On commercial thin units where whole tree harvesting is used implement one of the following mitigations for nutrient cycling; 1) use in woods processing equipment that leaves slash on site, 2) for whole tree harvest, return skid slash and evenly distribute within the harvest area, or 3) cut off tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Considering data from the DNRC Soil Monitoring Report (DNRC, 2004), the implementation of Forestry Best Management Practices has resulted in less risk of detrimental soil impacts from erosion, displacement and severe compaction. While the report noted that the impacts were more likely on the fine textured soils and steep slopes, reduced soil productivity due to compaction and displacement may occur on coarser parent materials similar to those found in the state parcels. Also, the greatest impacts were noted where harvest implementation departed from BMPs such as limiting ground-based skidding to slopes of 40 percent or less.

Comparing the soil type map, field reconnaissance notes and topographic map features with the proposed harvest unit map indicates that under this alternative ground-based skidding would occur on slopes of up to 40%, on well-drained relatively rocky soils. The extent of impacts expected would likely be similar to those reported by Collins (DNRC, 2004), or approximately 12-14% of the harvest area. Potential impacts to soils from the cable yarding units would be less than 10% of the area. This level of impact assumes corridor spacing of at least 75 feet, and

impacts generally confined to a 6-8 feet width. Potential impacts to soils from cable yarding would generally be displacement although some compaction could occur. In addition, cable corridors pose a slight risk of routing water because the corridor is generally parallel to the fall-line of the hillslope. Table ST-2 summarizes the expected impacts to soils within harvest units.

Table ST-2: Expected acres of impact to soil from compaction and displacement

Harvest Method and Season	No Action Alternative	Action Alternative
Ground Based (12-14% of harvest area)	0	25-30 acres
Cable (10% of harvest area)	0	13.0 acres
Total Area of Impacts (acres)	0	38-43
Total Harvest Acres	0	342
Percent Area Impacted	0	11.1%-12.6%

In addition to the potential impacts from harvesting, approximately 8-10 acres would be taken out of production and converted to roads. Road construction would likely result in more erosion than native topography; however BMP implementation would minimize the risk of erosion. Because no stream crossings are proposed, the risk of delivering soil to watercourses would be very low.

As vegetation begins to establish on the impacted areas, and freeze-thaw cycles occur, the area of reduced productivity would decrease.

Cumulative Soil Effects

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15% of harvest units (as recommended by the SFLMP) through implementation of BMPs, skid trail planning on tractor units and limiting operations to dry or frozen conditions. Future harvest opportunities would likely use the same road system, skid trails and landing sites to reduce additional cumulative impacts. Large woody debris would be retained for nutrient cycling long-term soil productivity.

By mitigating the direct and indirect effects with soils moisture restrictions, season of use and method of harvest, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low.

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WILDLIFE ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no public comments were received. Thus, internal comments regarding the effects of proposed timber harvesting led to the following list of issues:

- There is concern that timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely upon these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.
- There is concern that timber harvesting could alter the species composition and recruitment of large-sized snags and coarse woody debris, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.
- There is concern that timber harvesting and associated activities could alter cover, increase access and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.
- There is concern that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- There is concern that timber harvesting and associated activities could remove elk security cover, which could affect hunter opportunity and local quality of recreational hunting.
- There is concern that timber harvesting and associated activities could remove thermal cover and snow intercept on big game winter ranges, which could reduce carrying capacity of the winter range.

The following sections disclose the anticipated indirect, direct and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past and current activities on all ownerships within each analysis area as well as planned future agency actions have been taken into account for the cumulative effects analysis.

Analysis Area

In this section the discussions will focus on 2 areas of different scale. The first will be the “project area”, which consists of the 360 state managed acres in Section 16 in T22N, R30W. The parcel ranges from 2,600 to 3,640 feet and is largely on a northeastern aspect with slopes of varying steepness. The parcel is dominated by Douglas-fir/western larch and lodgepole pine habitats with 1 mixed conifer stand. The second scale or the “analysis area” relates to the surrounding landscape for assessing cumulative effects. The scales of these analysis areas vary according to the species being discussed, but generally approximate the size of the home range of the discussed species.

Analysis Methods

DNRC attempts to promote biodiversity by taking a ‘coarse-filter approach’, which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full

complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.

The existing conditions of wildlife habitats will be described under the existing conditions section of this analysis. The environmental effects section will compare the existing conditions in each analysis area to the anticipated effects of the proposed No-Action and Action Alternatives to determine the foreseeable impacts to associated wildlife habitats.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

COARSE FILTER ANALYSIS

Of the 108 mammal species found in Montana, 68 are suspected or known to occur in Sanders County (Foresman 2001). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Eight amphibian and nine reptile species have also been documented in Sanders County (Maxell et al. 2003) and at least 151 species of birds have been documented in the vicinity in the last 10 years (Lenard et al. 2003). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have increased and shade-tolerant species, such as Douglas-fir and subalpine fir have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats.

Mature Forested Habitats and Landscape Connectivity

Issue: There is concern that timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely upon these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.

A variety of wildlife species rely upon mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). The proposed project area currently contains approximately 129 acres of mature stands (100+ years in age) of reasonably closed canopy western larch/Douglas-fir, ponderosa pine, and mixed conifers.

Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape. Today, the

mosaic of ownership and diversity of past management within the general vicinity of the project area have compromised connectivity and forest-interior habitats to a degree. Forested habitats in the project area are presently part of a larger forested patch; however the project area is largely on the lower edge of this larger forested patch.

Cumulative effects were analyzed on the 8 surrounding sections and the remaining portion of section 16 (totaling approx 5,759 terrestrial acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of harvesting, amount of densely forested habitats, and connectivity. Presently a large portion of the analysis area (approximately 52%) is forested, however at least 365 acres (roughly 6%) have been harvested in the last 10-20 years, and is not suitable habitat for wildlife requiring mature forested stands or connected forested areas. Additionally, roughly 1,456 acres (approximately 25%) are in younger stands or thinned forests, which are also not contributing to mature forested habitats or connectivity, but could in the near future. Roughly 901 acres (16%) are in agricultural types, which are also not suitable for wildlife species requiring mature forested habitats or connected forested habitats. Connectivity in the analysis area has been compromised, to a degree, with differing ownerships and management, including past clearing for agricultural and human development purposes, and more recently with timber harvesting occurring in the vicinity. However, the western half of the analysis area is fairly well connected beyond the cumulative effects analysis area with other USFS lands. Within the analysis area, agricultural areas, human developments, Highway 200, and the Clark Fork River provide some barriers to wildlife movement.

Direct and Indirect Effects on Mature Forested Habitats and Connectivity

No Action Alternative

Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with a dense canopy. Individual trees and possibly pockets could continue to die and create openings where younger trees could become established. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No near-term changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit over time, while those requiring conditions likely found under natural disturbance regimes would be somewhat underrepresented. Habitat for forested interior species and mature-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would likely improve; however western larch and ponderosa pine, as preferred snag species, would decline in abundance over time. Thus, since there would be no harvesting, continued maturation in the proposed units, and no changes to forest connectivity, direct and indirect effects to wildlife species requiring mature forested habitats and connectivity would be negligible positive effects. These effects would affect the respective wildlife species in the local area until another form of disturbance reverses stand succession in the project area.

Action Alternative

Approximately 118 (91%) of the 129 acres of mature forest in the project area capable of providing habitat connectivity, would be treated largely with seedtree and shelterwood type treatments (110 acres) where Douglas-fir/western larch would be largely removed. The remaining 8 acres of mature stands would be commercially thinned. Within the areas proposed to receive seed tree and shelterwood treatments, a younger, more open stand would be expected, while proposed thinning prescriptions would enhance radial tree growth. Generally, these conditions could interrupt movement by species requiring extensive, connected forested habitats; however this parcel is on the interface between the forested areas to the southwest and the open, agricultural, developed, and small woodlot areas to the northeast, therefore, the proposed harvesting may disrupt some movement, however species requiring extensive, connected forested habitats are not likely using this parcel extensively for movements across the

landscape. The resultant changes in stand age and density would likely reduce habitats for species associated with old stands, such as American marten and pileated woodpeckers, which have benefited from the increasing stand ages and densities caused by modern fire suppression. In general, habitat conditions would improve for species adapted to the more open forest condition, while declining for species that prefer dense, mature forest conditions. Due to 1) the amount of mature forested habitats treated and the proposed prescriptions, 2) the location of harvest units, and 3) negligible changes in forested connectivity due to the location on the landscape, minor adverse effects to species preferring dense forest conditions would be expected. These effects would affect the respective wildlife species in the local area for 30-100 years.

Cumulative Effects on Mature Forested Habitats and Connectivity

No Action Alternative

The surrounding landscape is a mosaic of forested stands intermixed with recently harvested stands, agricultural fields, and residential development. With this alternative, stands on the state parcel would continue to contribute to the mature-forested habitats in the analysis area. Past harvesting on USFS and private lands has reduced the amount of the analysis area in mature-forested habitats. Additionally, clearing for agriculture and human development has further reduced mature forested habitats and altered landscape connectivity. Through time, some of the younger forested stands that have been harvested in the last 30 years would start developing mature forest stand characteristics. With this alternative, stands on the state parcel would continue to contribute to the mature forested stands in the analysis area. No appreciable changes to amount of mature, forested habitats, level of harvesting, or connectivity would be anticipated. Use of the analysis area by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be expected to continue at present levels. Limited habitat for mature-stand-associated species, such as the American marten and pileated woodpecker, would likely persist at current levels. Thus, since there would be no further changes in the amounts of harvested areas and cumulative increases in stand density and forest encroachment into non-forested openings would improve habitats for wildlife preferring mature forested habitats, negligible positive effects would be anticipated. Wildlife in the local area would be affected until some other form of disturbance reverses stand succession in the analysis area.

Action Alternative

The surrounding landscape is a mosaic of forested stands intermixed with recently harvested stands, agricultural fields, and residential development. With this alternative, mature stands on much of the project area would be harvested to varying degrees, removing some or all of the mature forested cover; however prescriptions in the commercial thinning units (total of 212 acres; only 9 acres within existing mature habitats) would retain adequate numbers of trees to facilitate some use by wildlife species requiring mature forested stands and connected forested habitats. This would reduce the amount of the 5,759-acre analysis area in mature stands from 52% to 50% and increase the amount of younger, harvested stands in the analysis area from 6% to 9% of the analysis area). Stands across the analysis area would continue maturing and gradually move towards mature stands. Little changes to connectivity would occur given the general location of the proposed units near the edges of the forested habitats in the analysis area. Wildlife species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would see a reduction in available habitats. In general, a reduction in mature forested habitats and habitats for species associated with mature forests within the analysis area would reduce overall quality within this area for those species. Thus, due to the location of harvest units, relatively small amount of mature forested habitat affected, and negligible changes to forested connectivity, cumulative effects to mature forested habitats and connectivity would be

minor adverse effects to these wildlife species in the analysis area that could last from about 30 to 100 years.

Snags and Coarse Woody Debris

Issue: There is concern that timber harvesting could alter the species composition and recruitment of large-sized snags and coarse woody debris, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.

Snags and coarse woody debris are important components of the forested ecosystems. Five primary functions of deadwood in the forested ecosystems are: 1) increase structural diversity, 2) alter canopy microenvironment, 3) promote biological diversity, 4) provide important habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (Parks and Shaw 1996). Snags and defective trees (partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (Hejl and Woods 1991). The quantity, quality, and distribution of snags affect the presence and population size of many of these species. Larger diameter, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites for a variety of birds and mammals.

Coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food storage sites for several wildlife species. Small mammals, such as red-backed voles (*Clethrionomys gapperi*), to large mammals, such as black bears (*Ursus americana*), rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their capacity to meet these life requisites. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles provide foraging sites for weasels and denning sites for Canada lynx.

During field visits, 0-5 variably spaced snags per acre and differing quantities of coarse woody debris were observed in the project area. The snags and coarse woody debris in the project area exhibit the range of sizes and decay classes, ranging from small to large and sound to almost fully decayed.

Cumulative effects were analyzed on all lands within 1 mile of the project area (totaling approx 5,759 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of harvesting, number of snags and coarse woody debris, and risk level of firewood harvesting. Within the cumulative effects analysis area, diverse ownership patterns have resulted in varying amounts of snag and coarse woody debris being retained. On approximately 16% of the analysis area, agriculture and human development clearing has removed snags and coarse woody debris. On USFS lands, snag ad coarse woody debris levels vary, largely based upon distance to the open roads. Elsewhere, harvesting on private ownerships has largely reduced snag and coarse woody debris levels on those lands.

Direct and Indirect Effects on Snags and Coarse Woody Debris (CWD)

No Action Alternative

No direct changes in the amounts of snags and CWD would be expected. Snags would continue to provide wildlife habitats and new snags would be recruited as trees die. A long-term reduction in shade-intolerant snags could occur as these species would be replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as

long lasting nesting structures and foraging habitats, for cavity nesting birds. Coarse woody debris would persist without other disturbances influencing distribution and quality; snag and CWD loss to legal and illegal firewood and forest product gathering could occur. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. A slight increase in the accumulation of snags and coarse woody debris would be anticipated over the next several decades given current stand conditions. Thus, since there would be no harvesting, negligible changes in the numbers of snags, and no change in the level of firewood gathering, negligible positive direct and indirect effects to snags and coarse woody debris would be anticipated. Wildlife species requiring snags and coarse woody debris in the project area would see immeasurable changes in available habitats until some other form of disturbance reduces these habitat attributes.

Action Alternative

Present and future snags and CWD would be reduced due to timber harvesting on 342 acres within the project area. A minimum of two large snags/acre (>14 in dbh; >21 in. dbh where they exist), two large snag recruits/acre (>14 in. dbh; >21 in. dbh where they exist), and 5-10 tons of CWD/acre would be planned for retention within the proposed units. However, some of this material could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with ARM 36.11.411. Snag loss could continue after the project due to legal and illegal firewood and forest product gathering. A slight increase in the accumulation of snags and coarse woody debris could occur over the next several decades given current stand conditions. Within the harvested units, it could take 50-100 years to develop 10-20 inch dbh trees at current stand densities that could serve as snags and downed woody material in the future. Future snag quality in the harvested units would be enhanced with proposed silvicultural prescriptions that either increase radial growth of existing western larch, Douglas-fir, and ponderosa pine or lead to the re-establishment of these same species, which are largely shade-intolerant species that tend to provide important habitats, such as long lasting nesting structures and foraging habitats, for cavity nesting birds. Given the amounts, range of variability in sizes and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. Thus, since harvesting would reduce snag, snag recruitment trees, and CWD, direct and indirect effects to snags and coarse woody debris would be minor adverse effects that would affect wildlife requiring these attributes for 30-100 years.

Cumulative Effects on Snags and Coarse Woody Debris

No Action Alternative

Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition within the stands due to advances in succession. Snags have been retained during some of the past harvesting in the cumulative effects analysis area. Additionally, firewood and other forest product gathering in the vicinity have also reduced these deadwood resources. Portions of the analysis area that are non-forested would continue to lack snags and coarse woody debris. Wildlife species that rely on snags and coarse woody debris in the analysis area would be expected to persist. Thus, since no further harvesting would occur, negligible changes in the numbers of snags, and no change in the level of firewood gathering, negligible positive cumulative effects to snags and coarse woody debris would be anticipated. Wildlife species requiring snags and coarse woody debris in the analysis area would see immeasurable changes in available habitats until some other form of disturbance reduces these habitat attributes.

Action Alternative

Snags and coarse woody debris would be reduced on much of the project area for potentially 50 to 100 years until similar-sized trees have grown within harvested stands to current densities. Within the project area, the species composition of future snags could also be altered with changing species composition within the stands due to advances in succession and timber harvesting, which would tend to favor shade intolerant tree species and associated wildlife. Limited numbers of snags have been retained during some of the past harvesting on private ownerships in the cumulative effects analysis area. Additionally, firewood and other forest product gathering in the vicinity have also reduced these deadwood resources. Additionally, 16% of the analysis is non-forested agricultural fields and human developments that lack snags and coarse woody debris. The losses of snags and coarse woody debris under this alternative would be additive to the previous harvests in the area. However, the project requirements to retain a minimum of two large snags/acre (>14 in. dbh; > 21 in. dbh where they exist), two snag recruitment trees/acre (>14 in. dbh; > 21 in. dbh where they exist), and 5-10 tons of CWD/acre would mitigate additional cumulative effects associated with this project. Wildlife species that rely on snags and coarse woody debris in the analysis area would be expected to persist at similar levels, albeit slightly lower numbers on proposed harvest sites following treatment. Thus, since 1) a slight, but cumulative amount of the analysis area would be harvested reducing snags and snag recruit trees while increasing CWD levels, and 2) no change in the level of firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term, minor adverse effects to wildlife requiring snags and CWD would be anticipated that would affect these species in the analysis area for 30-100 years.

Threatened and Endangered Species

Three species indigenous to Montana are classified as “threatened’ or “endangered” under the Endangered Species Act of 1973. The grizzly bear and Canada lynx are listed as "threatened," while the gray wolf is listed as “endangered.”

•Gray wolf (*Canis lupus*)

The Fishtrap wolf pack occupies an area centered approximately 24 air miles northeast of the project area and has been documented as close as 15 miles from the project area. No known den or rendezvous sites are known in the vicinity; however several landscape features frequently associated with these sites exist in the vicinity of the project area. Deer and elk, the primary prey species of wolves in Montana, are known to use the proposed project area for most of the year. Wolves could pass through the area at any time, however little use is anticipated with the current distribution of wolves. Since wolves are not using the project area and important wolf habitats (denning and rendezvous sites) would not be affected, no direct, indirect, or cumulative effects would be expected and this species will not be discussed further.

•Grizzly bear (*Ursus arctos*)

Issue: There is concern that timber harvesting and associated activities could alter cover, increase access and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.

Grizzly bears are wide-ranging mammals that use non-forested and forested upland habitats. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. The proposed project is located 3 miles west of the Cabinet-Yaak Grizzly Bear Recovery Zone (USFWS 1993) and is included in “occupied habitat” as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (T.

Wittinger, Unpub. Interagency Map). Therefore, grizzly bears could show up in the proposed project area at any time.

Managing human access is a major factor in management for grizzly bear habitats. Presently, open road densities in the section (approx. 1.83 miles/sq. mile; simple linear calculations) are relatively high. Although grizzly bears could use the project area at any time, extensive use is unlikely given the high levels of human disturbance, relatively unrestricted vehicular access much of the year, and marginal grizzly bear habitat values existing in the project area.

Cumulative effects were analyzed on a 29,014-acre analysis area that is the southeastern portion of the "occupied habitat" map that includes the project area and as adjacent to the Mount Headley subunit of the Cabinet-Yaak Grizzly Bear Recovery Zone. The analysis area consists of small, privately managed lands (15,857 acres), lands managed by the USFS (11,867 acres) and only a minor DNRC component (883 acres). Factors considered within this analysis area include level of human disturbance, availability of timbered stands for hiding cover, and miles of open roads. Portions of the analysis area receive low human use, while the majority of the analysis area experiences extensive human use and associated disturbance. Stands in the vicinity are a combination of age classes, ranging from recently harvested stands to mature stands. Agricultural areas dominate the lower elevations on private ownerships. Portions of the analysis area have been harvested recently, while others have seen limited or no harvest in the past. Human disturbance levels and level of forest harvesting are both closely tied to road access. Access, particularly open road access, varies across the analysis area, with portions being very accessible while other portions are less accessible.

Direct and Indirect Effects on Grizzly Bears

No Action Alternative

No direct effects to grizzly bears would be expected. Risk of disturbance to grizzly bears using the proposed project area for any type of life requirement would be lowest under this alternative. Foraging opportunities might decline due to the lack of diversity in habitat such as forest edge and younger age-class stands. No changes in open-road densities or hiding cover would be anticipated. Thus, since no changes in available habitats or level of human disturbance would be anticipated, no direct or indirect effects to grizzly bears would be anticipated.

Action Alternative

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources, should bears occur in the area. No appreciable changes in long-term open road densities would be anticipated under this alternative since all new construction would be restricted after the proposed harvesting. Hiding cover would be reduced on most of the 342 acres in the proposed harvest units in the short-term, however it would improve with time as shrub and tree regeneration proceeds. Thus, since 1) extensive grizzly bear use is unlikely, 2) no changes in long-term open road densities would be anticipated, 3) hiding cover losses would be short-lived; any adverse direct or indirect effects to grizzly bears in the local area would be negligible and occur in the short-term.

Cumulative Effects of on Grizzly Bears

No Action Alternative

Motorized access to the area and hiding cover would remain unchanged. Existing forested stands throughout the analysis area would be expected to persist in to the future; regenerating stands are either presently providing hiding cover and forage resources, or would be expected to

do so in the near future. Extensive human development and associated disturbance in the analysis area likely limits likelihood of grizzly bear use; present levels of human disturbance would be expected to continue into the future. Thus, since no changes in available habitats or level of human disturbance would be anticipated, no cumulative effects to grizzly bears in the area would be anticipated.

Action Alternative

The increased use of road systems during the proposed project would temporarily increase human disturbance to grizzly bears within the analysis area, should they occur there. Proposed activities would occur between the portion of the analysis area already experiencing human disturbance, largely associated with open roads and private ownerships, and the more remote portions of the analysis area. No changes in long-term open-road densities would be expected; fairly extensive amounts road systems facilitate considerable human access. No permanent increases in human disturbance level would be expected to result from this project. Reductions in hiding cover would be additive to the reductions from past timber harvesting as well as more permanent land-cover changes in the analysis area; however, portions of the analysis area are currently providing hiding cover. Early successional stages of vegetation occurring in harvest units could provide foraging opportunities that do not exist in some mature stands. Thus, since 1) extensive use is unlikely, 2) no changes in long-term open road densities or human disturbance levels would be anticipated, and 3) adequate cover exists on adjacent ownerships should grizzly bears be displaced from the project area, and 4) hiding cover losses on the state parcel would be short-lived, negligible adverse cumulative effects would be expected for a short period of time (3-5 years).

•Canada Lynx (*Lynx canadensis*)

Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 2,600 to 3,640 feet in elevation. The parcel is dominated by Douglas-fir/ western larch and lodgepole pine. Primary lynx habitats are subalpine-fir types with abundant coarse woody debris for denning; however, lynx will use a mix of species compositions (subalpine fir, lodgepole pine, Douglas-fir, grand fir, and western larch). Lynx generally forage in young coniferous forests with plentiful snowshoe hares. Mature, densely forested cover facilitates movement and provides habitats for red squirrels, which are an alternative prey source for lynx.

Since the project area is low elevation, contains appreciable winter range, and is comprised of stands not typically used by lynx, lynx are not expected to use the area. Therefore, direct, indirect, and cumulative effects to Canada lynx would not be expected as a result of either alternative and this species will not be analyzed or discussed further.

Sensitive Species

When conducting forest-management activities, DNRC gives special consideration to habitat requirements of several sensitive species. These species are sensitive to human activities, have special habitat requirements that might be altered by timber management, or might become listed under the Federal Endangered Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met.

A search of the Montana Natural Heritage Database documented flammulated owls and Coeur d'Alene salamanders within 3 miles. Table W-2 shows how each sensitive species was either included in the following analysis or was removed from further analysis due to habitat availability.

TABLE W-2 – LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROPOSED PROJECT

SPECIES	DETERMINATION – BASIS
Bald eagle (*Haliaeetus leucocephalus*)	No further analysis conducted – The project area is 3.5 miles south of the nearest known bald eagle nest at Finley Flats and is separated from the nest by large areas of unsuitable habitats. However, the Clark Fork Rover is over 1.5 miles away from the project area. Therefore, direct, indirect, and cumulative effects to bald eagles would be minimal and this species will not be discussed further.
Black-backed woodpecker (*Picoides arcticus*)	No further analysis conducted – No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander (*Plethodon idahoensis*)	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*)	No further analysis conducted – No suitable grassland communities occur in the project area. Thus, no direct, indirect or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon (*Gavia immer*)	No further analysis conducted – No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fisher (*Martes pennanti*)	No further analysis conducted – No suitable low elevation riparian areas with high canopy closure habitats occur within the project area. Additionally, the project area does not provide upland connectivity between other patches of potential fisher habitats. Thus, no direct, indirect or cumulative effects to fishers would be expected to occur as a result of either alternative.
Flammulated owl (*Otus flammeolus*)	**Included** –Some suitable dry ponderosa pine and Douglas-fir habitats occur within the project area.
Harlequin duck (*Histrionicus histrionicus*)	No further analysis conducted – No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming (*Synaptomys borealis*)	No further analysis conducted – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon (*Falco peregrinus*)	No further analysis conducted – No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect or cumulative effects to Peregrine falcons are anticipated as a result of either alternative.
Pileated woodpecker (*Dryocopus pileatus*)	**Included** – Western larch-Douglas-fir, black cottonwood, and ponderosa pine habitats occur in the project area that could provide foraging and nesting habitats.
Townsend's big-eared bat (*Plecotus townsendii*)	No further analysis conducted – No suitable caves or mine tunnels occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.

Sensitive Species Assessed

•Pileated woodpecker *(Dryocopus pileatus)*

Issue: There is concern that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

Pileated woodpeckers excavate the largest cavities of any woodpecker. The cavities are frequently used in subsequent years by many other species of birds and mammals. Preferred nest trees are western larch, ponderosa pine, black cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat insects, mainly carpenter ants, which inhabit stumps, snags, and large downed logs. Nesting habitat for pileated woodpeckers consists of mature stands generally below 5,000 feet in elevation with 100 to 125 square feet per acre of basal area and a relatively closed canopy (Aney and McClelland 1985). The feeding- and nesting-habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests. Pileated woodpeckers appear to be positively correlated with the amount of dead and/or dying wood in a landscape (McClelland 1979).

The project area ranges from 2,600 to 3,640 feet in elevation and is dominated by Douglas-fir/western larch, with lesser amounts of ponderosa pine, lodgepole pine, and mixed conifers. Some black cottonwood trees are located in the bottoms where the project area abuts neighboring agricultural fields. During field visits, several feeding sites and 0 to 5 variably (12+ in dbh) spaced snags per acre were observed in the proposed project area. Potential pileated woodpecker nesting habitats exists on 129 acres within the project area. Additionally, roughly 238 acres of sawtimber-sized stands exist in the project area that likely serve as foraging habitats.

Cumulative effects were analyzed on the 8 surrounding sections and the remaining portion of section 16 (totaling approx 5,759 terrestrial acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area included the degree of harvesting and the amount of continuous forest within the analysis area. Presently a large portion of the analysis area (3,013 acres, 52%) is forested, however at least 365 acres (6%) have been harvested in the last 10-20 years, and is not suitable pileated woodpecker habitat. Additionally, roughly 1,456 acres (25%) are in younger stands or thinned forests, which may provide some marginal foraging habitats and may mature into more suitable pileated habitats through time. Roughly 901 acres (16%) are in agricultural types, which are also not suitable for pileated woodpeckers.

Direct and Indirect Effects on Pileated Woodpeckers

No Action Alternative

No direct effects would be anticipated under this alternative. Western larch, Douglas-fir, ponderosa pine, and black cottonwood would continue to grow and die over time, providing nesting and foraging habitat. As these trees die, replacement shade-intolerant trees would be underrepresented in the stand unless other disturbances influence the stands, allowing for their regeneration. Therefore, a reduction in suitable nesting trees would be likely over time. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time, and then decline. Thus, since no harvesting would occur, no changes in the amount of continuously forested habitats would be anticipated, and long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers would be anticipated, minor adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession.

Action Alternative

Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but could be temporarily displaced by the proposed harvesting and road-building activities. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags/acre > 14 in. dbh; >21 in. dbh where they exist), coarse woody debris (5-10 tons/acre), numerous leave trees, and snag recruits (a minimum of 2 trees/acre >14 in. dbh; > 21 in. where they exist) would be retained in the proposed units. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (see snags and coarse woody debris section), which further affects pileated woodpeckers now and into the future. After the proposed harvesting, 129 acres in the proposed seedtree and shelterwood units may be largely too open to be considered pileated woodpecker habitats, while the 194 acres proposed for a commercial thin treatment would likely still have sufficient cover to facilitate some pileated woodpecker foraging and possibly nesting. The silvicultural prescriptions would retain healthy western larch, ponderosa pine, and Douglas-fir while promoting the regeneration of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, since harvesting would reduce the amount of continuous forested habitats available, some snags and snag recruits would be lost, mitigation measures to retain a minimum of 2 snags/acre and 2 snag recruits/acre, and the prescriptions to promote seral species in the proposed units, direct and indirect effects to pileated woodpeckers would be minor adverse effects that would directly affect pileated woodpeckers in the project area for the short-term, while indirectly affecting them for 30-100 years.

Cumulative Effects on Pileated Woodpeckers

No Action Alternative

Western larch, ponderosa pine, and Douglas-fir trees would continue to grow and die over time in the proposed project area, providing nesting and foraging habitats. Through time, conversion of stands to shade-tolerant species would reduce nesting substrates for pileated woodpeckers. The portion of the analysis area that is forested (52%) would be expected to continue providing potential pileated woodpecker habitat while the 1,456 acres (25%) that are younger stands and/or thinned stands would be expected to start developing forested habitats through time, improving habitats for pileated woodpeckers in the analysis area. Habitat would continue to be absent from the developed and non-forested areas. Thus, since 1) existing stands would continue to age, contain increasingly larger trees, continue becoming more structurally diverse, and experience more mortality that could provide better foraging and nesting habitats, and 2) no further reductions in continuous forested habitats would occur, minor beneficial cumulative effects to pileated woodpeckers in the analysis area would be anticipated.

Action Alternative

Reductions in pileated woodpecker habitats would be expected. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags/acre >14 in. dbh; >21 in. where they exist), CWD (5-10 tons/acre), numerous leave trees, and snag recruits (a minimum of 2 large trees/acre >14 in. dbh; > 21 in. dbh where they exist) would be retained in the proposed units. However, the 129 acres proposed for seed tree and shelterwood type treatments may be too open for appreciable pileated woodpecker use after harvesting; some post-harvest use of the commercial thin units by pileated woodpeckers could be possible. Overall, mature, forested habitats would be reduced from 52% to 50% of the analysis area. Within the analysis area, as recently harvested stands mature, future foraging habitat is developing and may be suitable in the next 40-60 years. The reductions in forested habitats associated with this alternative could reduce the carrying capacity of the analysis area; however the analysis area would still be expected to be able to support several a couple of pairs of pileated woodpeckers.

Thus, since harvesting would reduce the amount of continuous forested habitats, snags, and coarse woody debris in the cumulative effects analysis area, and prescriptions would promote the regeneration of shade-intolerant species and mitigation measures to retain a minimum of 2 snags/acre (>14 in. dbh; >21 in. dbh where they exist) and 2 snag recruits/acre (>14 in. dbh; >21 in. dbh where they exist) would be applied within the proposed harvest units, minor adverse cumulative effects to pileated woodpeckers would affect pileated woodpeckers for 30-100 years.

•Flammulated Owl *(Otus flammeolus)*

Issue: Timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States. Flammulated owls are secondary cavity nesters and they usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroaches upon ponderosa pine stands, increasing stand density and resulting in eventual decreased habitat quality for flammulated owls. Although the stands in the project area are largely Douglas-fir/western larch, some ponderosa pine exists in some portions of the project area. The current conditions likely are a result of past encroachment by Douglas-fir. Preferred flammulated owl habitat types exist on 112 acres of the project area, and are largely Douglas-fir/western larch and ponderosa pine types that are fairly dense. During field visits, 0-5 sizeable (>12" dbh) snags were observed in the project area. Generally, rather low quality flammulated owl habitats dominate the project area.

Cumulative effects were analyzed on the 8 surrounding sections and the remaining portion of section 16 (totaling approx 5,759 terrestrial acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area included the amount of open, mature stands of ponderosa pine and amount of dense, mixed conifer stands. In the analysis area, open grown ponderosa pine trees exist in portions of the analysis area, particularly on some of the private parcels. However, many of these habitats are continuing to mature and are becoming increasingly dense. Elsewhere in the analysis area, modern fire suppression has led to dense stands of western larch/Douglas-fir and mixed conifers. However, some flammulated owl habitats may exist in the project area on 1,456 acres (25%) of younger or thinned forested stands and the 365 acres that have been harvested in the recent past. Foraging habitats could exist in the interface between some of the non-forested habitats and the forested environments. In general, the quality and quantity of habitats for flammulated owls in the analysis area is fairly low.

Direct and Indirect Effects on Flammulated Owls

No Action Alternative

Portions of the project area are densely forested and are poor quality flammulated owl habitats. No direct effects would be anticipated and no immediate changes to the existing density of the limited ponderosa pine trees or other trees in the stands would be anticipated. Regeneration of ponderosa pine would not be expected in these dense stands and open-grown Douglas-fir trees would not develop without major disturbance influencing the stands. Therefore, habitat sustainability and quality for flammulated owls would continue to decline. Thus, since no changes would be anticipated in the amount of open, mature stands of ponderosa pine or the amount of dense, mixed conifer stands, indirect effects to flammulated owl habitat would be minor adverse effects, which would affect flammulated owls in the project area until some form of disturbance reverses stand succession.

Action Alternative

Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively impact flammulated owls should they be using existing habitat during the nesting period. Proposed timber harvest would open the canopy while favoring western larch, Douglas-fir, and ponderosa pine. Elements of the forest structure important for nesting flammulated owls would be retained, including snags (a minimum of 2 snags/acre >14 in. dbh; >21 where they exist), CWD (5-10 tons/acre), numerous leave trees, some pockets of regeneration, and snag recruits (a minimum of 2 trees/acre >14 in dbh; >21 in. dbh where they exist). Realistically, however, some snags would likely be removed due to safety and/or logistical concerns, but replacements would be identified in order to ensure compliance with ARM 36.11.411. This net reduction in snags would further affect flammulated owls now and into the future. Roughly 42% of the preferred flammulated owl habitat types in the project area would receive a seed tree type treatment, with another 20% and 21% of the flammulated owl habitat types receiving shelterwood and commercial thinning type treatments, respectively. Proposed retention of ponderosa pine and Douglas-fir in these units would provide nesting and foraging habitats. Prescriptions to enhance radial growth of ponderosa pine and Douglas-fir in the proposed commercial thin unit would promote habitat sustainability and development of large trees, and improve the availability of desirable habitat components over the long-term. The more open stand conditions, the retention of some fire adapted tree species, and the maintenance of existing snags would move the proposed project area closer to historical conditions, which is preferred flammulated owl habitat. Thus, since the amount of open, mature ponderosa pine stands would increase slightly, and the amount of dense forested stands would decrease, direct effects would likely to be minor, short-term adverse effect due to disturbance potential during logging activities meanwhile indirect effects to flammulated owls would be minor positive effects that could benefit flammulated owls in the project area for 20-40 years.

Cumulative Effects on Flammulated Owls

No Action Alternative

Poor quality flammulated owl habitat would persist in the project area. In general, the quality and quantity of habitats for flammulated owls in the 5,759-acre cumulative effects analysis area is fairly low. Some past harvesting that created foraging habitats and reversed some of the Douglas-fir encroachment in the cumulative effects analysis area has improved flammulated owl habitats. However retention of large ponderosa pine was not necessarily a consideration by several landowners, thereby minimizing the benefits to flammulated owls. Continued maturation and in-growth leading to denser stands on mixed conifers are reducing flammulated owl habitats across the analysis area. Thus, since no changes in the amount of open, mature ponderosa pine stands would be anticipated and the amount of dense mixed-conifer stands would continue increasing due to succession and encroachment, cumulative effects to flammulated owls would be negligible adverse effects and would affect flammulated owls in the local area until some form of disturbance reverses stand succession in the analysis area.

Action Alternative

Prescriptions that would move the proposed stands towards historic conditions of more open stands would have minor positive benefits to flammulated owls. This would add to the amount of the analysis area that has been harvested in the recent past. However, the enhanced habitat created with this harvesting would not likely affect flammulated owl populations appreciably as habitat is somewhat limited throughout the larger analysis area. Negligible additional changes to habitats on adjacent ownerships would be anticipated; recently harvested stands would continue to mature and improve in quality, but those stands currently suitable would likely continue to become denser and start declining in quality for flammulated owls. Thus, since the amount of open, mature ponderosa pine stands would increase slightly, and the amount of dense forested

stands would decrease, cumulative effects would be minor positive effects that would benefit flammulated owls in the local area for 20-40 years.

Big Game

•Elk (*Cervus elaphus)* Security Habitat

Issue: There is concern that timber harvesting and associated activities could remove elk security cover, which could affect hunter opportunity and local quality of recreational hunting.

The proposed project area falls within the hunting district 121. The hunting district is within the Lower Clark Fork Elk Management Unit (EMU), which covers approximately 2,896 square-miles (DFWP 2004). Moderate road densities facilitate hunter access to much of the unit.

Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and subsequent decrease in hunter opportunity.

Dense, large (≥ 250 acres) forest patches at least ½ mile from an open road that would provide elk (and subsequently deer) security (Hillis et al. 1991) are absent from the state parcels; however nearly 147 acres of the project area that is far enough from the open road could serve as security cover in conjunction with available habitat on adjacent USFS lands. It is expected that when elk security is substantially compromised, effects to deer can also be expected (albeit to a lesser degree than for elk). Summer use of the proposed project area by deer and elk was documented during field visits.

Cumulative effects were analyzed on hunting district 121 (624,931 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include amount of the analysis area recently harvested and the level of road access in the area. The district is largely dominated by ponderosa pine and western larch/Douglas-fir in the lower elevations and transitions into lodgepole pine, mixed conifers, and subalpine fir habitats with increasing elevations. Areas of regenerating forest are intermixed within this matrix, and non-forested areas dominate some of the lower elevations. Human access to the analysis area on open and closed roads provides considerable vehicular and foot access; however, there are also areas inaccessible from existing roads, including wilderness and roadless areas.

Direct and Indirect Effects on Elk Security Habitat

No Action Alternative

No changes in elk security cover or hiding cover would be expected. Elk security would still be largely absent from the project area. Timber stands would continue advancing to climax plant species. No changes would be anticipated in disturbance and elk vulnerability due to hunting. Thus, direct and indirect effects to elk security would be minor positive benefits that would benefit elk and other big game until stand succession is altered by another mechanism or human access to the area is changed.

Action Alternative

By definition, no changes in elk security cover would be expected since much of the proposed project area would still remain within ½ mile of an open road, and that portion that is far enough

away from the open road is too small to provide elk security habitat. Within the project area, prescriptions calling for a seed tree and shelterwood treatments (129 acres) would likely be too open to provide much elk security, while those areas receiving commercial thinning (194 acres) treatments would likely continue to provide some cover that could benefit elk during the hunting season. No changes in motorized access to the state parcel would be anticipated under this alternative, however the new roads proposed to be constructed and closed after use could facilitate an increase in foot traffic. Increased sight distances and the reduction in hiding cover may decrease big game survival in the project area. Thus, since 1) no changes in existing security habitats would be anticipated, 2) no changes in open road densities would be expected, and 3) potential for slight decreases in big game survival, minor adverse effects to big game would be anticipated that would affect big game for 10-30 years.

Cumulative Effects on Elk Security Habitat

No Action Alternative

No changes would be anticipated in elk security cover, big game hiding cover, or hunter accessibility. Over time, recently harvested stands would mature and hiding cover would improve, but this would likely offset the reductions associated with ongoing harvesting. Temporal shifts in security cover in the analysis area can be expected as successional stages change, but long-term changes would not be expected. Additionally, no changes to the levels of human access would be anticipated. Thus, no cumulative effects to elk security would be anticipated.

Action Alternative

Increased sight distances could reduce big game survival in the project area. Of the 147 acres of the project area that could be contributing to elk security habitat on adjacent USFS ownership, roughly 137 acres are proposed for harvesting (80 acres commercial thin, 39 acres seed tree, and 19 acres shelterwood). The portions proposed to receive a commercial thin (80 of 137 acres) could continue providing cover that would likely afford elk some cover during the general big game season. Proposed road construction could facilitate an increase in foot traffic. Short-term reductions in hiding cover would be also expected with this alternative. Access in the analysis area is relatively reasonable given the amount of open roads and access points. Portions of the analysis area have been harvested, reducing hiding cover, but at the analysis area level, appreciable hiding cover exists. In general, negligible effects to elk security cover, hiding cover, or survival at the analysis area level would be expected with this alternative. Thus, since 1) portions of one block of security habitat would be altered, 2) no changes in open road densities would be expected, 3) the amount of the district unaffected by the proposal, and 4) the high levels of hiding cover, security habitat present in the analysis area, negligible adverse effects to elk security would be anticipated that would affect big game for 10-30 years.

•Big Game Winter Range

Issue: There is concern that timber harvesting and associated activities could remove thermal cover and snow intercept on big game winter ranges, which could reduce carrying capacity of the winter range.

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be restricted low-snow zones and areas within a landscape that support winter concentrations of big game, which are more widely distributed during the remainder of the year. Desirable forest stand characteristics on winter ranges in western Montana include adequate midstory and overstory to reduce wind velocity and intercept snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage and reduces their expenditure of energy. This is particularly important during severe

winters when elk and deer are under extreme levels of stress. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

DFWP identified the lower 236 acres of the project area as white-tailed deer and elk winter range. The winter range in the project area is part of larger white-tailed deer and elk winter ranges (149,695 and 187,577 acres, respectively). Winter snow depths and suitable microclimates influence big game distribution and use within the Lower Clark Fork drainage and the project area. Mature Douglas-fir/western larch, mixed conifers, and lodgepole pine stands in the project area are providing attributes facilitating use by wintering big game. Proximity to human developments and open roads has likely slightly reduced winter range capacity of the winter range in the project area. Evidence of summer use by deer and elk was noted throughout the project area during field visits.

Cumulative effects were analyzed on the contiguous 187,577-acre elk winter range using a combination of field evaluation and aerial photograph interpretation. Factors considered within this analysis area include acres of winter range harvested and level of human disturbance and development. The winter range generally follows the Clark Fork Rover and Highway 200, which has seen considerable human disturbance and development in the past. Presently, a variety of stands across the winter range are likely providing thermal cover and snow intercept for big game, but are interspersed with unsuitable habitats and human developments. The quality of the winter range has been compromised with the extensive development and land cover conversions that have occurred across the winter range. Besides the human disturbance associated with these developed areas, recreation and timber harvesting in these less developed areas likely influence elk wintering on this range. Fortunately, this winter range exists in a portion of western Montana, where winter conditions are more favorable for big game survival, and thus winter ranges in poorer condition are still able to support healthy big game populations.

Direct and Indirect Effects on Big Game Winter Range

No Action Alternative

No direct effects to big game winter range would be anticipated. No additional disturbance or displacement would be anticipated within the project area. Big game thermal cover in the project area would not be altered in the near term. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. No appreciable changes to winter carrying capacity would be anticipated. Since 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated, 2) the amount of mature forested habitats on the winter range would not change appreciably, and 3) the levels of human disturbance would remain similar, no direct or indirect effects to big game winter range would be anticipated.

Action Alternative

Some displacement would be expected as a result of the proposed harvesting operations, particularly if they occur during the winter period. However, it would be anticipated that deer would concentrate feeding activity in winter on felled tree tops, limbs and slash piles during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner may partially offset some of the effects associated with temporary displacement caused by logging disturbance. This short-term benefit would not be expected to offset impacts associated with removal of thermal cover over the long-term (several decades). Big game thermal cover and snow intercept would be reduced or removed on 199 acres of the 236 acres of white-tailed deer winter range in the project area. Roughly 134 acres of this winter range area would be commercial thinned, which would reduce thermal cover and snow intercept, but these stands would be expected to continue providing these attributes at a slightly reduced level. The seedtree/shelterwood prescriptions on the remaining 65 acres of the winter range

would create open stands that would be largely too open to function as thermal cover or snow intercept, thus eliminating habitat attributes that would enable concentrated winter use by white-tailed deer and elk. The reductions in quality within the commercial thin units would be relatively short-lived (15-30 years) since the remaining trees would begin to occupy the added growing space and thus gradually improve thermal cover and snow intercept. Loss of thermal cover and snow intercept in the seedtree/shelterwood unit would be a more long-term effect as it would require 40-60 years for suitable sized trees (>40 ft. tall) to develop in the stand, but the increased representation of western larch would generally be a reduction in winter range quality over existing conditions. Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production within the units. Thus, since 1) the relatively short-term that logging activities would create disturbance in this area, 2) a high percentage of the winter range in the project area would be altered, but most of the alterations would continue to provide some thermal cover and snow intercept capacity, 3) the behavioral adaptability of white-tailed deer, 4) availability of cover on surrounding ownerships that provides some opportunity for deer should they be displaced in the short or long term, minor effects to white-tailed deer would be expected for the next two decades.

Cumulative Effects on Big Game Winter Range

No Action Alternative

Under this alternative, no changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover would be expected to continue providing this resource under this alternative. Continued winter use of the winter range would be anticipated. Harvesting on adjacent ownerships would be expected to continue removing winter range and displacing wintering big game. Those portions of the winter range where timber has been harvested in the last 30 years would start developing thermal cover and snow intercept in the next 10-30 years. Those areas that have been converted agriculture or other human developments would not be expected to provide thermal cover or snow intercept in the future. Human disturbance levels across the winter range would be anticipated to continue at similar levels. Thus, under this alternative, no cumulative effects to big game winter range would be anticipated.

Action Alternative

Displacement associated with this alternative would be additive to the disturbance and displacement associated with ongoing timber sales other ownerships. However, disturbance associated with this alternative would be short-term and last for 3-5 years. Thermal cover and snow intercept capabilities would be largely removed from 65 acres of the winter range in the project area, and would be reduced on an additional 134 acres, which would be additive to the past reductions associated with timber harvesting, human development, and agricultural clearing that has occurred on the winter range. Due to the following considerations: 1) the scale of the area being considered for treatment (199 acres) given the amount which would remain untreated in the CE analysis area considering other ownerships (187,378 acres – 99.8% unaffected), 2) the normal winter conditions affecting deer in the area, 3) the behavioral adaptability of white-tailed deer, and 4) the relatively short-term that logging activities would create disturbance in this area in conjunction with disturbance factors on other ownerships, negligible cumulative effects to deer would be anticipated that would affect deer in the local area for 40-60 years.

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Wildlife Mitigations

- Cease all operations if a threatened or endangered species is encountered. Consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435).

- Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.

- Manage for snags (minimum of 2 snags/acre > 14 in. dbh; > 21 in. dbh where they exist), snag recruits (minimum of 2 recruits/acre > 14 in. dbh; > 21 in. dbh where they exist), and coarse woody debris (5-10 tons/acre), particularly favoring western larch and ponderosa pine (ARM 36.11.439(1)(b)).

- Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.

- Reduce views into harvest units along the open road where feasible using a combination of topography, group retention, roadside vegetation buffers, and retention of pockets of advanced regeneration.

- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1)(m)).

ARCHAEOLOGICAL ANALYSIS

From: Olsen, Dave
Sent: Wednesday, August 02, 2006 5:15 PM
To: Peters, Dale
Subject: FW: Deemer Peak Area, Trout Creek Area, and Mosquito Creek Area Timber Sale Proposals

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From: Rennie, Patrick
Sent: Tuesday, August 01, 2006 11:07 AM
To: Olsen, Dave
Subject: Deemer Peak Area, Trout Creek Area, and Mosquito Creek Area Timber Sale Proposals

Hi Dave:

After reviewing location and topographic maps for the three subject projects, I see no cultural resource concerns with the Deemer Peak an Mosquito Creek Area sales mainly because they are on relatively steep (steep from an archaeological perspective) slopes. Alternately, Section 36, T25N R32W looks (from the topo map) to have more level surfaces and consequently, I recommend that I take a look at this sale area before timber harvest activities begin. When you have harvest unit boundaries established for the Trout Creek Area sale would you send me a copy of the topo map with those boundaries indicated?

Thanks,

Patrick Rennie
DNRC Archaeologist

Attachment III
Harvest Prescriptions

Footnote: All proposed road miles, harvest boundaries and acreages are close approximations as this proposal has not yet been implemented on the ground.

Unit:	S1	**Elevation:**	2640' – 3120'	**Slope:**	4 - 60%
Acres:	23	**Location:**	SW1/4 SE1/4	**Aspect:**	Northeast

Habitat Types:	11 acres	(591) ABGR/LIBO – LIBO
	12 acres	(521) ABGR/CLUN - CLUN
Current Cover Type:	11 acres	Western Larch/Douglas Fir
	12 acres	Douglas Fir
Desired Future Condition:	23 acres	Western Larch/Douglas Fir & Douglas Fir

Soil Type:	80%	(21F) Combest gravelly ashy silt loam, 35 to 60 percent
	20%	(85D) Whitepine ashy silt loam, 4 to 15 percent slopes

Current Stand Conditions:

SLI Stand # 2	11 acres	**(591)**	**WL/DF**	**Good - Average Vigor**	
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)			
	Upper Canopy %	**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF 60-69	DF	60-69	GF	70-79
2nd spp.	WL 10-19	WL	10-19	DF	10-19
3rd spp.	GF 10-19	GF	10-19		
4th spp.		LPP	0-9		
Ave DBH	18	10		3	
Height	95	70		20	
Age	120 (85-220)	90		60	
Vigor	Good - Average	Average - Poor		Poor	
Potential Productivity		Coarse Woody Debris		Insect & Disease	
105 M.A.I. (ft3/acre/yr)		16	tons/acre	Mistletoe	Root rots

SLI Stand # 3		12 acres	**(521)**		**DF**	**Below Ave - Poor Vigor**	
Saw timber; Well stocked 70%+			Multi-storied (three or more canopy levels)				
	Upper Canopy %		**Middle Canopy %**			**Lower Canopy %**	
1st spp.	DF	80-89	DF	70-79		GF	80-89
2nd spp.	WL	0-9	GF	10-19		DF	0-9
3rd spp.	GF	0-9	WL	0-9			
4th spp.							
Ave DBH	14		9			3	
Height	95		70			25	
Age	120	(90-220)	80			70	
Vigor	Good - Average		Average - Poor			Very poor	
Potential Productivity 107 M.A.I. (ft3/acre/yr)			Coarse Woody Debris 14.9 tons/acre			Insect & Disease Root rots	

Treatment Objectives: S1

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Move that portion of the stand that is currently classified as Douglas-fir toward the Desired Future Condition classification of western larch/Douglas-fir.
- Promote natural western larch and Douglas-fir regeneration, particularly western larch in those areas where root rots are evident.

Prescribed Treatment:

- Seed Tree Harvest; spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm and that have the bark characteristics to withstand a prescribed burn.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 35-42 feet, leaving 25-35 TPA.
- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Line skidding operations are applicable to this unit; hand falling required.
- Trees marked to leave.

Hazard Reduction:

- Yarding of tops required. Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and broadcast burned.

Regeneration/Site Preparation: S1

- Broadcast burn to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	S2	**Elevation:**	3080' – 3560'	**Slope:**	35 - 60%
Acres:	9	**Location:**	SE1/4 SW1/4 NE1/4 SW1/4	**Aspect:**	Southeast

Habitat Types:	9 acres	(262) PSME/PHMA - CARU
Current Cover Type:	9 acres	Ponderosa Pine
Desired Future Condition:	9 acres	Douglas Fir

Soil Type:	70%	(32F) Mitten gravelly ashy silt loam, 35 to 60 percent slopes
	30%	(21F) Combest gravelly ashy silt loam, 35 to 60 percent

Current Stand Conditions:

SLI Stand # 4	9 acres	**(262)**	**PP**	**Good - Average Vigor**
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF	50-59	DF	80-89	DF	70-79
2nd spp.	PP	30-39	PP	0-9	GF	10-19
3rd spp.	WL	0-9			PP	0-9
4th spp.						
Ave DBH	18		11		2	
Height	95		70		20	
Age	120	(57-175)	70		50	
Vigor	Good - Average		Good -Average		Average - Poor	

Potential Productivity M.A.I.		Coarse Woody Debris		Insect & Disease	
70	(ft3/acre/yr)	12.9	tons/acre	Root rots	Mistletoe

Treatment Objectives: S2

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Move that portion of the stand that is currently classified as ponderosa pine toward the Desired Future Condition classification of western larch/Douglas-fir.

Prescribed Treatment:

- Selective Commercial Thinning, spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant ponderosa pine, western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 35-42 feet, leaving 25-35 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Line skidding operations are applicable to this unit; hand falling required.
- Trees marked to leave.

Hazard Reduction:

- Yarding of tops required. Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and lopped.

Regeneration/Site Preparation:

- Selective Commercial Thinning; regeneration and site preparation is not an issue.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit: S3 **Elevation:** 2720' – 3680' **Slope:** 35 - 60%
Acres: 50 **Location:** N1/2 SW1/4 **Aspect:** Northeast

Habitat Types:
37 acres (521) ABGR/CLUN - CLUN
13 acres (262) PSME/PHMA - CARU

Current Cover Type:
33 acres Western Larch/Douglas Fir
13 acres Douglas Fir
4 acres Mixed Conifer

Desired Future Condition:
37 acres Western Larch/Douglas Fir
13 acres Douglas Fir

Soil Type:
90% (32F) Mitten gravelly ashy silt loam, 35 to 60 percent slopes
10% (32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes

Current Stand Conditions:

SLI Stand # 8	33 acres	**(521)**	**WL/DF**	**Good - Average Vigor**
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF	50-59	DF	60-69	GF	60-69
2nd spp.	WL	20-29	WL	10-19	DF	20-29
3rd spp.	LPP	10-19	LPP	0-9		
4th spp.	GF	0-9	GF	0-9		
Ave DBH	14		8		3	
Height	90		70		20	
Age	80	(70-80)	65		60	
Vigor	Good - Average		Average - Poor		Very Poor	

Potential Productivity M.A.I. (ft3/acre/yr)	Coarse Woody Debris		Insect & Disease	
			Root	Bark
107	13.2	tons/acre	rots	beetle

SLI Stand # 5	13 acres	(262)	DF	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	80-89	DF	80-89	DF	80-89
2nd spp.	WL	0-9	WL	0-9	GF	0-9
3rd spp.	PP	0-9	PP	0-9		
4th spp.			GF	0-9		
Ave DBH	15		10		3	
Height	85		60		25	
Age	80	(75-80)	80		60	
Vigor	Good - Average		Average - Poor		Very poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			6.6	tons/acre	Root rots	

SLI Stand # 7	4 acres	(521)	MC	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	WL	50-59	LPP	50-59	DF	50-59
2nd spp.	LPP	20-29	DF	20-29	GF	30-39
3rd spp.	DF	10-19	GF	0-9	WH	0-9
4th spp.			WL	0-9	LPP	0-9
Ave DBH	12		8		3	
Height	85		65		25	
Age	90	(75-95)	70		50	
Vigor	Good - Average		Average - Poor		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			19.2	tons/acre	Bark beetle	Mistletoe

Treatment Objectives: S3

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Move that portion of the stand that is currently classified as Douglas-fir and mixed conifer toward the Desired Future Condition classification of western larch/Douglas-fir.
- A healthy wind firm stand that would retain some of the current visual aesthetics.

Prescribed Treatment:

- Selective Commercial Thinning, spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 21-23 feet, leaving 80-100 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Line skidding operations are applicable to this unit; hand falling required.
- Trees marked to cut. Lopping of tops.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and lopped.

Regeneration/Site Preparation:

- Commercial thinning operation; regeneration and site preparation is not an issue.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for re-entry as the stand progresses in age.

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Unit:	S4	**Elevation:**	3040’ – 3200’	**Slope:**	35 - 60%
Acres:	3	**Location:**	SW1/4 NW1/4	**Aspect:**	East

Habitat Types: 3 acres (261) PSME/PHMA - PHMA

Current Cover Type: 3 acres Western Larch/Douglas Fir

Desired Future Condition: 3 acres Western Larch/Douglas Fir

Soil Type: 100% (82F) Sharrott, cool-Rock outcrop-Rubble land complex, 15 to 60 percent slopes

Current Stand Conditions:

SLI Stand # 11	3 acres	**(261)**	**WL/DF**	**Full Vigor**
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF	70-79	DF	70-79	DF	80-89
2nd spp.	WL	10-19	PP	0-9	GF	0-9
3rd spp.	PP	0-9	LPP	0-9		
4th spp.						
Ave DBH	19		10		3	
Height	90		65		25	
Age	80		70		30	
Vigor	Full		Good - Average		Good - Average	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			3.1	tons/acre	Root rots	Bark beetle

Treatment Objectives: S4

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Promote natural western larch and Douglas-fir regeneration, particularly western larch in those areas where root rots are evident.

Prescribed Treatment:

- Seed Tree Harvest; spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm and that have the bark characteristics to withstand a prescribed burn.

- Remove all merchantable grand fir and lodgepole pine. S4
- Variable spacing of 65-95 feet, leaving 5-10 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Line skidding operations are applicable to this unit; hand falling required.
- Trees marked to leave.

Hazard Reduction:

- Yarding of "at least half" tops required.
- Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and broadcast burned.

Regeneration/Site Preparation:

- Broadcast burn to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	S5	**Elevation:**	2620' – 3240'	**Slope:**	4 - 80%
Acres:	44	**Location:**	NW1/4 NW1/4	**Aspect:**	Northeast

Habitat Types:	40 acres	(521) ABGR/CLUN - CLUN
	4 acres	(261) PSME/PHMA - PHMA
Current Cover Type:	44 acres	Western Larch/Douglas Fir
Desired Future Condition:	44 acres	Western Larch/Douglas Fir

Soil Type:	85%	(132F) Mitten-Tevis complex, 35 to 60 percent slopes
	5%	(32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes
	10%	(82F) Sharrott, cool-Rock outcrop-Rubble land complex, 15 to 60 percent slopes

Current Stand Conditions:

SLI Stand # 13	40 acres	(521)	WL/DF	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	50-59	DF	40-49	DF	80-89
2nd spp.	WL	30-39	WL	40-49	GF	0-9
3rd spp.	GF	0-9	GF	0-9	WH	0-9
4th spp.					ES	0-9
Ave DBH	14		7		3	
Height	95		70		25	
Age	90	(70-150)	80		60	
Vigor	Good - Average		Average - Poor		Very Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			6.8	tons/acre	Root rots	

SLI Stand # 11	4 acres	(261)	WL/DF	Full Vigor
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	70-79	DF	70-79	DF	80-89
2nd spp.	WL	10-19	PP	0-9	GF	0-9
3rd spp.	PP	0-9	LPP	0-9		
4th spp.						
Ave DBH	19		10		3	
Height	90		65		25	
Age	80		70		30	
Vigor	Full		Good - Average		Good - Average	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			3.1	tons/acre	Root rots	Bark beetle

Treatment Objectives: S5

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- A healthy wind firm stand that would retain some of the current visual aesthetics.

Prescribed Treatment: S5

- Selective Commercial Thinning, spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 17-19 feet, leaving 125-145 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Line skidding operations are applicable to this unit; hand falling required.
- Trees marked to cut. Lopping of tops.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and lopped.

Regeneration/Site Preparation:

- Commercial thinning operation; regeneration and site preparation is not an issue.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for re-entry as the stand progresses in age.

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Unit:	T1	**Elevation:**	3000' – 3280'	**Slope:**	10 - 45%
Acres:	42	**Location:**	SW1/4 SE1/4	**Aspect:**	Northeast
			SE1/4 SW1/4		Northwest
Habitat Types:		24 acres	(591) ABGR/LIBO – LIBO		
		13 acres	(521) ABGR/CLUN - CLUN		
		5 acres	(262) PSME/PHMA - CARU		
Current Cover Type:		24 acres	Western Larch/Douglas Fir		
		10 acres	Mixed Conifer		
		5 acres	Ponderosa Pine		
		3 acres	Douglas Fir		
Desired Future Condition:		34 acres	Western Larch/Douglas Fir		
		8 acres	Douglas Fir		
Soil Type:	75%	(32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes			
	25%	(821F) Combest gravelly ashy silt loam, 35 to 60% slopes			

Current Stand Conditions:

SLI Stand # 2	24 acres	(591)	WL/DF	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	60-69	DF	60-69	GF	70-79
2nd spp.	WL	10-19	WL	10-19	DF	10-19
3rd spp.	GF	10-19	GF	10-19		
4th spp.			LPP	0-9		
Ave DBH	15		10		3	
Height	90		70		20	
Age	120	(85-220)	90		60	
Vigor	Good - Average		Average - Poor		Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
105			16	tons/acre	Mistletoe	Root rots

SLI Stand # 1	10 acres	(521)	MC	Below Ave - Poor Vigor
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	WL	80-89	LPP	60-69	DF	40-49
2nd spp.	DF	0-9	WL	10-19	GF	30-39
3rd spp.			DF	10-19	LPP	0-9
4th spp.					WP	0-9
Ave DBH	14		8		1	
Height	95		70		10	
Age	120	(90-220)	90		40	
Vigor	Good - Average		Good - Average		Very poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			20	tons/acre	Root rots	Bark beetle

SLI Stand # 4	5 acres	(262)	PP	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	50-59	DF	80-89	DF	70-79
2nd spp.	PP	30-39	PP	0-9	GF	10-19
3rd spp.	WL	0-9			PP	0-9
4th spp.						
Ave DBH	18		11		2	
Height	95		70		20	
Age	120	(55-175)	70		50	
Vigor	Good - Average		Good - Average		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			12.9	tons/acre	Root rots	Mistletoe

SLI Stand # 3	3 acres	(521)	DF	Below Ave - Poor Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	80-89	DF	70-79	GF	80-89
2nd spp.	WL	0-9	GF	10-19	DF	0-9
3rd spp.	GF	0-9	WL	0-9		
4th spp.						
Ave DBH	14		9		3	
Height	95		70		25	
Age	120	(55-175)	80		70	
Vigor	Good - Average		Average - Poor		Very Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			14.9	tons/acre	Root rots	

Treatment Objectives: T1

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Move that portion of the stand that is currently classified as mixed conifer, ponderosa pine and Douglas-fir toward the Desired Future Condition classification of western larch/Douglas-fir.

- Promote natural western larch and Douglas-fir regeneration, particularly western larch in those areas where root rots are evident.
- A healthy wind firm stand that would retain some of the current visual aesthetics.

Prescribed Treatment:

- Shelterwood Harvest; spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 35-42 feet, leaving 25-35 TPA within that part of the stand currently classified as western larch/Douglas-fir.
- Variable spacing of 40-45 feet, leaving 20-25 TPA within that part of the stand currently classified as mixed conifer, ponderosa pine and Douglas-fir.
- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Slash would be lopped and /or trampled to a depth of 18” or less.
- Mechanical pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre on areas accessible to excavator.

Regeneration/Site Preparation:

- Mechanical scarification while piling to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	T2	**Elevation:**	3080' – 3820'	**Slope:**	10 - 45%
Acres:	37	**Location:**	SW1/4 SW1/4	**Aspect:**	Southeast

Habitat Types: 37 acres (262) PSME/PHMA - CARU

Current Cover Type: 37 acres Ponderosa Pine

Desired Future Condition: 37 acres Douglas Fir

Soil Type: 90% (21F) Combest gravelly ashy silt loam, 35 to 60 percent
10% (32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes

Current Stand Conditions:

SLI Stand # 4	37 acres	**(262)**	**PP**	**Good - Average Vigor**
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF	50-59	DF	80-89	DF	70-79
2nd spp.	PP	30-39	PP	0-9	GF	10-19
3rd spp.	WL	0-9			PP	0-9
4th spp.						
Ave DBH	18		11		2	
Height	95		70		20	
Age	120	(57-175)	70		50	
Vigor	Good - Average		Good -Average		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease Root rots	Mistletoe
70			12.9	tons/acre		

Treatment Objectives: T2

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Promote natural ponderosa pine, western larch and Douglas-fir regeneration.

Prescribed Treatment:

- Seed Tree Harvest; spacing out healthy vigorous trees with good crown and bark characteristics

- Favor leaving dominant and codominant ponderosa pine, western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 65-95 feet, leaving 5-10 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Slash would be lopped and /or trampled to a depth of 18" or less.
- Mechanical pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre on areas accessible to excavator.

Regeneration/Site Preparation:

- Mechanical scarification while piling to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	T3	**Elevation:**	3320' – 3920'	**Slope:**	20 - 45%
Acres:	27	**Location:**	NW1/4 SW1/4 SW1/4 SW1/4	**Aspect:**	North Northeast

Habitat Types:	25 acres	(521) ABGR/CLUN - CLUN
	2 acres	(262) PSME/PHMA - CARU
Current Cover Type:	25 acres	Western Larch/Douglas Fir
	2 acres	Ponderosa Pine
Desired Future Condition:	25 acres	Western Larch/Douglas Fir
	2 acres	Douglas Fir

Soil Type:	90%	(32F) Mitten gravelly ashy silt loam, 35 to 60 percent slopes
	10%	(32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes

Current Stand Conditions:

SLI Stand # 8	25 acres	(521)	WL/DF	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	50-59	DF	60-69	GF	60-69
2nd spp.	WL	20-29	WL	10-19	DF	20-29
3rd spp.	LPP	10-19	LPP	0-9		
4th spp.	GF	0-9	GF	0-9		
Ave DBH	14		8		3	
Height	90		70		20	
Age	80	(70-80)	65		60	
Vigor	Good - Average		Average - Poor		Very Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			13.2	tons/acre	Root rots	Bark beetle

SLI Stand # 4	2 acres	(262)	PP	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	50-59	DF	80-89	DF	70-79
2nd spp.	PP	30-39	PP	0-9	GF	10-19
3rd spp.	WL	0-9			PP	0-9
4th spp.						
Ave DBH	18		11		2	
Height	95		70		20	
Age	120	(57-175)	70		50	
Vigor	Good - Average		Good -Average		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			12.9	tons/acre	Root rots	Mistletoe

Treatment Objectives: T3

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- A healthy wind firm stand that would retain some of the current visual aesthetics.

Prescribed Treatment:

- Selective Commercial Thinning, spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch, Douglas-fir and ponderosa pine that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 17-19 feet, leaving 125-145 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to cut.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Residual un-merchantable material would be slashed and lopped.

Regeneration/Site Preparation:

- Commercial thinning operation; regeneration and site preparation is not an issue.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for re-entry as the stand progresses in age.

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Unit:	T4	**Elevation:**	2640' – 3280'	**Slope:**	10 - 35%
Acres:	35	**Location:**	SE1/4 NW1/4 SW1/4 NW1/4 NW1/4 SW1/4	**Aspect:**	Northeast East

Habitat Types:	29 acres	(521) ABGR/CLUN - CLUN
	6 acres	(261) PSME/PHMA - PHMA
Current Cover Type:	21 acres	Mixed Conifer
	8 acres	Lodgepole Pine
	6 acres	Western Larch/Douglas Fir
Desired Future Condition:	27 acres	Western Larch/Douglas Fir
	8 acres	Lodgepole Pine

Current Stand Conditions:

SLI Stand # 7	21 acres	**(521)**	**MC**	**Good - Average Vigor**
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	WL	50-59	LPP	50-59	DF	50-59
2nd spp.	LPP	20-29	DF	20-29	GF	30-39
3rd spp.	DF	10-19	GF	0-9	WH	0-9
4th spp.			WL	0-9	LPP	0-9
Ave DBH	12		8		3	
Height	85		65		25	
Age	90	(75-95)	70		50	
Vigor	Good - Average		Average - Poor		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			19.2	tons/acre	Bark beetle	Mistletoe

SLI Stand # 9	8 acres	(521)	LP	Below Ave - Poor Vigor
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	LPP	80-89	DF	80-89	DF	50-59
2nd spp.	WL	0-9	GF	0-9	GF	0-9
3rd spp.	DF	0-9			WH	0-9
4th spp.						
Ave DBH	10		6		3	
Height	80		45		25	
Age	80		60		60	
Vigor	Average - Poor		Average - Poor		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			48.6	tons/acre	Bark beetle	

SLI Stand # 11	6 acres	(261)	WL/DF	Good - Average Vigor
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	DF	70-79	DF	70-79	DF	80-89
2nd spp.	WL	10-19	PP	0-9	GF	0-9
3rd spp.	PP	0-9	LPP	0-9		
4th spp.						
Ave DBH	19		10		3	
Height	90		65		25	
Age	80		70		30	
Vigor	Full		Good - Average		Good - Average	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
70			3.1	tons/acre	Root rots	Bark beetle

Treatment Objectives: T4

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Salvage dead, down and dying lodgepole pine.
- Move that portion of the stand that is currently classified as mixed conifer toward the Desired Future Condition classification of lodgepole pine.
- Promote natural lodgepole pine, western larch and Douglas-fir regeneration.

Prescribed Treatment:

- Sanitation/Salvage Harvest; spacing out healthy vigorous trees with good crown and bark characteristics; within that part of the stand that is currently dominated by dead, down and dying lodgepole pine.
- Shelterwood Harvest; spacing out healthy vigorous trees with good crown and bark characteristics; within that part of the stand that still has a healthy mix of standing timber.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 29-33 feet, leaving 40-50 TPA within that part of the stand that still has a healthy mix of standing timber.
- Variable spacing of 65-95 feet, leaving 5-10 TPA within that part of the stand that is currently dominated by dead, down and dying lodgepole pine.
- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Slash would be lopped and /or trampled to a depth of 18” or less.
- Mechanical pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre on areas accessible to excavator.

Regeneration/Site Preparation:

- Mechanical scarification while piling to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	T5	**Elevation:**	3160' – 3400'	**Slope:**	35 - 60%
Acres:	7	**Location:**	SW1/4 NW1/4	**Aspect:**	East

Habitat Types: 7 acres (261) PSME/PHMA - PHMA

Current Cover Type: 7 acres Western Larch/Douglas Fir

Desired Future Condition: 7 acres Western Larch/Douglas Fir

Soil Type: 100% (82F) Sharrott, cool-Rock outcrop-Rubble land complex, 15 to 60 percent slopes

Current Stand Conditions:

SLI Stand # 11	7 acres	**(261)**	**WL/DF**	**Good - Average Vigor**
Saw timber; Med stocked 40-69%		Multi-storied (three or more canopy levels)		

	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	DF	70-79	DF	70-79	DF	80-89
2nd spp.	WL	10-19	PP	0-9	GF	0-9
3rd spp.	PP	0-9	LPP	0-9		
4th spp.						
Ave DBH	19		10		3	
Height	90		65		25	
Age	80		70		30	
Vigor	Full		Good - Average		Good - Average	
Potential Productivity 70	M.A.I. (ft3/acre/yr)		Coarse Woody Debris	3.1 tons/acre	Insect & Disease Root rots	Bark beetle

Treatment Objectives: T5

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Promote natural western larch and Douglas-fir regeneration, particularly western larch in those areas where root rots are evident.

Prescribed Treatment:

- Shelterwood Harvest; spacing out healthy vigorous trees with good crown and bark characteristics.

- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 45-55 feet, leaving 15-20 TPA.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to cut.

Hazard Reduction:

- Pile and burn at landings following harvest.
- Slash would be lopped and /or trampled to a depth of 18" or less.
- Mechanical pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre on areas accessible to excavator.

Regeneration/Site Preparation:

- Mechanical scarification while piling to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

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Unit:	T6	**Elevation:**	2600' – 2760'	**Slope:**	5 - 45%
Acres:	63	**Location:**	NE1/4 NW1/4 SW1/4 NW1/4 NW1/4 NW1/4	**Aspect:**	Flat Northeast

Habitat Types:	54 acres	(521) ABGR/CLUN - CLUN
	9 acres	(571) TSHE/CLUN - CLUN
Current Cover Type:	50 acres	Western Larch/Douglas Fir
	13 acres	Mixed Conifer
Desired Future Condition:	63 acres	Western Larch/Douglas Fir

Soil Type:	75%	(641D) Lionwood-Scotmont-Whitepine complex, 4 to 15%
	25%	(32E) Mitten gravelly ashy silt loam, 15 to 35 percent slopes

Current Stand Conditions:

SLI Stand # 6	50 acres	(521)	WL/DF	Good - Average Vigor
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	WL	70-79	ES	40-49	DF	50-59
2nd spp.	Cot	10-19	DF	20-29	GF	20-29
3rd spp.	ES	0-9	WL	10-19	WH	0-9
4th spp.	Asp	0-9	LPP	0-9	LPP	0-9
Ave DBH	16		9		2	
Height	100		70		15	
Age	90	(75-110)	70		20	
Vigor	Full		Average - Poor		Good - Average	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
107			7.8	tons/acre	Mistletoe	

SLI Stand # 12	9 acres	(571)	MC	Full
Saw timber; Well stocked 70%+		Multi-storied (three or more canopy levels)		

	Upper Canopy %		Middle Canopy %		Lower Canopy %	
1st spp.	WL	50-59	ES	30-39	DF	50-59
2nd spp.	LPP	20-29	DF	30-39	GF	0-9
3rd spp.	Cot	10-19	WH	10-19	WH	0-9
4th spp.	Asp	0-9	Will	10-19		
Ave DBH	16		10		3	
Height	90		60		25	
Age	90	(75-110)	60		60	
Vigor	Full		Good - Average		Average - Poor	
Potential Productivity M.A.I. (ft3/acre/yr)			Coarse Woody Debris		Insect & Disease	
109			7.4	tons/acre	Mistletoe	Bark beetle

SLI Stand # 7		4 acres	**(521)**		**MC**	**Good - Average Vigor**
Saw timber; Well stocked 70%+			Multi-storied (three or more canopy levels)			
	Upper Canopy %		**Middle Canopy %**		**Lower Canopy %**	
1st spp.	WL	50-59	LPP	50-59	DF	50-59
2nd spp.	LPP	20-29	DF	20-29	GF	30-39
3rd spp.	DF	10-19	GF	0-9	WH	0-9
4th spp.			WL	0-9	LPP	0-9
Ave DBH	12		8		3	
Height	85		65		25	
Age	90	(75-95)	70		50	
Vigor	Good - Average		Average - Poor		Average - Poor	
Potential Productivity M.A.I.			Coarse Woody Debris		Insect & Disease	
107	(ft3/acre/yr)		19.2	tons/acre	Bark beetle	Mistletoe

Treatment Objectives: T6

- Open up this stand by removing unhealthy trees, as well as those with poor vigor, to promote long-term forest health.
- Promote natural western larch and Douglas-fir regeneration.
- Retain a majority of the Black cottonwood *(Populus trichocarpa)* component.

Prescribed Treatment:

- Group Selection Harvest; spacing out healthy vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and codominant western larch and Douglas-fir that are wind firm with good crown and bark characteristics.
- Remove all merchantable grand fir and lodgepole pine.
- Variable spacing of 30-33 feet, leaving 40-50 TPA.
- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Trees marked to leave.

Hazard Reduction: T6

- Pile and burn at landings following harvest.
- Slash would be lopped and /or trampled to a depth of 18” or less.
- Mechanical pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre on areas accessible to excavator.

Regeneration/Site Preparation:

- Mechanical scarification while piling to prepare exposed mineral seedbed.
- Leave trees to provide seed source for natural regeneration.
- Monitor success of natural regeneration and plant seedlings if necessary.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration and possible pre-commercial thinning opportunities as the stand progresses in age.

Attachment IV
Mitigations

MITIGATION MEASURES

Roads: A transportation system minimizing road miles meeting Best Management Practices (BMP's) has been designed by the DNRC. This system proposes the construction of approximately 2.8 miles of new road, which would remain in place following project activity. After harvest activities have been completed the roads would be grass seeded, fertilized and closed to use. Approximately 1.8 miles of existing USFS roads would be incorporated into the transportation plan. Upon completion of roadwork, all haul roads would meet BMP's standards.

Wildlife: the following issues have been identified, with mitigation measures incorporated into the proposed project.

Cease all operations if a threatened or endangered species is encountered. Consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435).

Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.

Manage for snags (minimum of 2 snags/acre > 14 in. dbh; > 21 in. dbh where they exist), snag recruits (minimum of 2 recruits/acre > 14 in. dbh; > 21 in. dbh where they exist), and coarse woody debris (5-10 tons/acre), particularly favoring western larch and ponderosa pine (ARM 36.11.439(1) (b)).

Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.

Reduce views into harvest units along the open road where feasible using a combination of topography, group retention, roadside vegetation buffers, and retention of pockets of advanced regeneration.

Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1) (m)).

Soils: Limit equipment operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

On ground skidding units, the contractor and sale administrator would agree to a general skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use, and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) would not be used and may be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

Tractor skidding should be limited to slopes less than 40% unless the operation can be completed without causing excessive erosion. Short steep slopes above incised draws may require a combination of mitigation measures based on site review, such as adverse skidding to ridge or winch line skidding from more moderate slopes less than 40%.

Keep skid trails to 20% or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrent with operations.

Limit disturbance and scarification combined to 30-40% of harvest units. No dozer piling on slopes over 35%; no excavator piling on slopes over 40% unless the operation can be completed without causing excessive erosion.

Slash Disposal: No dozer piling on slopes over 35%; no excavator piling on slopes over 40% unless the operation can be completed without causing excessive erosion. Consider lop and scatter or jackpot burning on steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.

Retain 10 to 15 tons large woody debris and a majority of all fine litter feasible following harvest. On commercial thin units where whole tree harvesting is used implement one of the following mitigations for nutrient cycling; 1) use in woods processing equipment that leaves slash on site, 2) for whole tree harvest, return skid slash and evenly distribute within the harvest area, or 3) cut off tops from every third bundle of logs so that tops are dispersed as skidding progresses. These measures would be specified in the Timber Sale Contract and would be monitored by the Forest Officer.

Hydrology: All timber harvest would be regulated by the SMZ law and prohibit equipment operation within any SMZ. In addition to the resource protection provided by the SMZ law, forestry BMP's would be implemented in all aspects of the proposed timber harvest.

Cattle grazing would be removed for several years which would likely reduce bank trampling.

Weed Management: Measures to control the introduction or increases to infestations of noxious weeds would be implemented through the Timber Sale Contract. Control measures include the washing of all equipment prior to entering the project area and seeding all areas of disturbed soil associated with road construction or upgrades. Roads and skid trail approaches would again be seeded at the close of project activity. Measures to control any unforeseen outbreak would be implemented as needed through and beyond the project operational period.

Insects and Diseases: Promotion of open healthy timber stands would assist in controlling insect and disease activity in the project area.

Visual Impacts/Aesthetic Values: Prescriptions are designed to mimic historical stand conditions. Harvest unit shapes and residual tree retention patches would follow topographical features such as natural contour breaks and riparian retention zones. The cumulative visual effects of this proposed action in conjunction with current adjacent land management practices would blend into the landscape and soften any hard ownership boundaries.

Fuel Hazards: Harvest treatments would reduce ladder fuels and trees susceptible to fire. Slash would be treated either through logging system design, excavator piling and the burning of these piles, as designated by prescription per each individual harvest unit.

Stand Growth and Vigor: Silvicultural prescriptions are designed to maintain and improve stand growth and vigor, while maintaining DNRC's commitments to managing for a biologically diverse landscape.

Attachment V
Consultants & References

INDIVIDUALS CONSULTED

Larry Ballantyne; MT DNRC, Unit Manager, Plains Unit

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